JAD

Access DB# 86-814

SEARCH REQUEST FORM

Scientific and Technical Inf rmation Center

Requester's Full Name: BEN SACKEY Examiner # : 73489 Date: 2/14/03

Art Unit: 1626 Phone Number 30 5-6889 Serial Number: 09/913 280

Mail Box and Bldg/Room Location: CM1 3E11 Results Format Preferred (circle): PAPER DISK E-MAIL

3D19

If more than one search is submitted, please prioritize searches in order of need. mej

****

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: Process for the Manufacture of Furfural

Inventors (please provide full names): Karl J. Zeitsch and Hanna Epoipl

Earliest Priority Filing Date: 2/11/99

***For Sequence Searches Only* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.**

Process for manufacturing furfural by charging a reactor with PENTOSAN containing material is heated to a temperature (T_1) by introducing pressurized steam through a valve and subjecting the charge to gradual reduction of pressure until temperature (T_2) is reached. Depressurization being at a rate sufficient to maintain the liquid phase within the reactor in a constant ebullient state

Thanks

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Jan Delaval
Reference Librarian
Biotechnology & Chemical Library
CM1 1E07 – 703-308-4498
jan.delaval@uspto.gov

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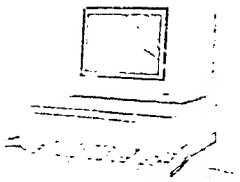
STAFF USE ONLY	Type of Search	Vendors and cost where applicable
Searcher: Jan	NA Sequence (#)	STN ✓
Searcher Phone #: 4498	AA Sequence (#)	Dialog
Searcher Location:	Structure (#)	Questel/Orbit
Date Searcher Picked Up: 2/16/03	Bibliographic ✓	Dr.Link
Date Completed: 2/16/03	Litigation	Lexis/Nexis
Searcher Prep & Review Time:	Fulltext	Sequence Systems
Clerical Prep Time: 10	Patent Family	WWW/Internet
Online Time: + 40	Other	Other (specify)

PTO-1590 (8-01)

BioTech-Chem Library
Search Results
Feedback Form (Optional)



Scientific & Technical Information Center

The search results generated for your recent request are attached. If you have any questions or comments (compliments or complaints) about the scope or the results of the search, please contact ***the BioTech-Chem searcher*** who conducted the search ***or contact***:

Mary Hale, Supervisor, 308-4258
CM-1 Room 1E01

Voluntary Results Feedback Form

- *I am an examiner in Workgroup:* *(Example: 1610)*
- *Relevant prior art **found**, search results used as follows:*
  - ☐ 102 rejection
  - ☐ 103 rejection
  - ☐ Cited as being of interest.
  - ☐ Helped examiner better understand the invention.
  - ☐ Helped examiner better understand the state of the art in their technology.

Types of relevant prior art found:

- ☐ Foreign Patent(s)
- ☐ Non-Patent Literature
  (journal articles, conference proceedings, new product announcements etc.)

- *Relevant prior art **not found**:*
  - ☐ Results verified the lack of relevant prior art (helped determine patentability).
  - ☐ Search results were not useful in determining patentability or understanding the invention.

Other Comments:

Drop off completed forms at the **Circulation Desk CM-1,** or send to Mary Hale, **CM1-1E01 or e-mail mary.hale@uspto.gov.**

```
=> fil reg
FILE 'REGISTRY' ENTERED AT 17:02:22 ON 16 FEB 2003
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Property values tagged with IC are from the ZIC/VINITI data file
provided by InfoChem.

STRUCTURE FILE UPDATES:   14 FEB 2003  HIGHEST RN 490576-14-2
DICTIONARY FILE UPDATES:  14 FEB 2003  HIGHEST RN 490576-14-2

TSCA INFORMATION NOW CURRENT THROUGH MAY 20, 2002

  Please note that search-term pricing does apply when
  conducting SmartSELECT searches.

Crossover limits have been increased.  See HELP CROSSOVER for details.

Experimental and calculated property data are now available.  See HELP
PROPERTIES for more information.  See STNote 27, Searching Properties
in the CAS Registry File, for complete details:
http://www.cas.org/ONLINE/STN/STNOTES/stnotes27.pdf

=> d ide can l1

L1   ANSWER 1 OF 1  REGISTRY  COPYRIGHT 2003 ACS
RN   98-01-1  REGISTRY
CN   2-Furancarboxaldehyde (9CI)  (CA INDEX NAME)
OTHER CA INDEX NAMES:
CN   2-Furaldehyde (8CI)
OTHER NAMES:
CN   .alpha.-Furole
CN   2-Formylfuran
CN   2-Furanaldehyde
CN   2-Furancarbaldehyde
CN   2-Furancarbonal
CN   2-Furfural
CN   2-Furfuraldehyde
CN   2-Furylaldehyde
CN   2-Furylcarboxaldehyde
CN   Artificial ant oil
CN   Fural
CN   Furaldehyde
CN   Furancarbonal
CN   Furfural
CN   Furfuraldehyde
CN   Furfurol
CN   Furfurole
CN   Furfurylaldehyde
CN   Furole
CN   Pyromucic aldehyde
FS   3D CONCORD
MF   C5 H4 O2
CI   COM
LC   STN Files:   AGRICOLA, ANABSTR, AQUIRE, BEILSTEIN*, BIOBUSINESS, BIOSIS,
       BIOTECHNO, CA, CABA, CANCERLIT, CAOLD, CAPLUS, CASREACT, CBNB, CEN,
       CHEMCATS, CHEMINFORMRX, CHEMLIST, CHEMSAFE, CIN, CSCHEM, CSNB, DDFU,
       DETHERM*, DIPPR*, DRUGU, EMBASE, ENCOMPLIT, ENCOMPLIT2, ENCOMPPAT,
       ENCOMPPAT2, GMELIN*, HODOC*, HSDB*, IFICDB, IFIPAT, IFIUDB, IPA,
       MEDLINE, MRCK*, MSDS-OHS, NAPRALERT, NIOSHTIC, PDLCOM*, PIRA, PROMT,
       RTECS*, SPECINFO, TOXCENTER, TULSA, ULIDAT, USPAT2, USPATFULL, VTB
         (*File contains numerically searchable property data)
```

Other Sources: DSL**, EINECS**, TSCA**
(**Enter CHEMLIST File for up-to-date regulatory information)

PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

14415 REFERENCES IN FILE CA (1962 TO DATE)
331 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
14429 REFERENCES IN FILE CAPLUS (1962 TO DATE)
10 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

REFERENCE 1: 138:109279

REFERENCE 2: 138:108624

REFERENCE 3: 138:108621

REFERENCE 4: 138:108592

REFERENCE 5: 138:106850

REFERENCE 6: 138:106653

REFERENCE 7: 138:106627

REFERENCE 8: 138:106573

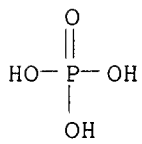
REFERENCE 9: 138:106572

REFERENCE 10: 138:106569

=> d ide can l2

L2 ANSWER 1 OF 1 REGISTRY COPYRIGHT 2003 ACS
RN 7664-38-2 REGISTRY
CN **Phosphoric acid (7CI, 8CI, 9CI)** (CA INDEX NAME)
OTHER NAMES:
CN 3M Etching Liquid
CN Amberphos 54
CN C 134
CN C 134 (acid)
CN C 434
CN C 434 (acid)
CN Conditioner 36
CN Decon 4512
CN EVITs
CN HQ 54
CN K-etchant
CN Kefo
CN Mikro Klene DF
CN Orthophosphoric acid
CN Panavia Etching Agent
CN Sonac
CN SPA 2
CN SPA 2 (catalyst)
CN TG 434

CN Ultra-Etch Gel
CN Ultraetch
CN Uni-Etch
CN WC-Reiniger
FS 3D CONCORD
DR 28602-75-7, 178560-73-1
MF H3 O4 P
CI COM
LC STN Files: AGRICOLA, ANABSTR, AQUIRE, BIOBUSINESS, BIOSIS, BIOTECHNO, CA, CABA, CANCERLIT, CAOLD, CAPLUS, CASREACT, CBNB, CEN, CHEMCATS, CHEMINFORMRX, CHEMLIST, CIN, CSCHEM, CSNB, DDFU, DETHERM*, DIOGENES, DIPPR*, DRUGU, EMBASE, ENCOMPLIT, ENCOMPLIT2, ENCOMPPAT, ENCOMPPAT2, GMELIN*, HSDB*, IFICDB, IFIPAT, IFIUDB, IPA, MEDLINE, MRCK*, MSDS-OHS, NAPRALERT, NIOSHTIC, PDLCOM*, PIRA, PROMT, RTECS*, SPECINFO, TOXCENTER, TULSA, ULIDAT, USAN, USPAT2, USPATFULL, VETU, VTB
(*File contains numerically searchable property data)
Other Sources: DSL**, EINECS**, TSCA**
(**Enter CHEMLIST File for up-to-date regulatory information)



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6940 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
47526 REFERENCES IN FILE CAPLUS (1962 TO DATE)
1 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

REFERENCE 1: 138:116680

REFERENCE 2: 138:116435

REFERENCE 3: 138:116379

REFERENCE 4: 138:116368

REFERENCE 5: 138:116359

REFERENCE 6: 138:115135

REFERENCE 7: 138:114853

REFERENCE 8: 138:114004

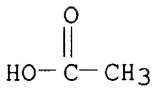
REFERENCE 9: 138:114001

REFERENCE 10: 138:113990

=> d ide can l3

L3 ANSWER 1 OF 1 REGISTRY COPYRIGHT 2003 ACS
RN 64-19-7 REGISTRY
CN **Acetic acid (7CI, 8CI, 9CI)** (CA INDEX NAME)
OTHER NAMES:
CN **acetic acid**

CN Aci-Jel
CN Ethanoic acid
CN Ethanoic acid monomer
CN Ethylic acid
CN Glacial acetic acid
CN Methanecarboxylic acid
CN Vinegar acid
FS 3D CONCORD
DR 77671-22-8
MF C2 H4 O2
CI COM
LC STN Files: ADISNEWS, AGRICOLA, ANABSTR, AQUIRE, BEILSTEIN*, BIOBUSINESS, BIOSIS, BIOTECHNO, CA, CABA, CANCERLIT, CAOLD, CAPLUS, CASREACT, CBNB, CEN, CHEMCATS, CHEMINFORMRX, CHEMLIST, CHEMSAFE, CIN, CSCHEM, CSNB, DDFU, DETHERM*, DIOGENES, DIPPR*, DRUGU, EMBASE, ENCOMPLIT, ENCOMPLIT2, ENCOMPPAT, ENCOMPPAT2, GMELIN*, HODOC*, HSDB*, IFICDB, IFIPAT, IFIUDB, IPA, MEDLINE, MRCK*, MSDS-OHS, NAPRALERT, NIOSHTIC, PDLCOM*, PIRA, PROMT, RTECS*, SPECINFO, TOXCENTER, TULSA, ULIDAT, USAN, USPAT2, USPATFULL, VETU, VTB
(*File contains numerically searchable property data)
Other Sources: DSL**, EINECS**, TSCA**
(**Enter CHEMLIST File for up-to-date regulatory information)



PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

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3550 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
71355 REFERENCES IN FILE CAPLUS (1962 TO DATE)
2 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

REFERENCE 1: 138:117012

REFERENCE 2: 138:116718

REFERENCE 3: 138:116435

REFERENCE 4: 138:116280

REFERENCE 5: 138:113995

REFERENCE 6: 138:113164

REFERENCE 7: 138:113064

REFERENCE 8: 138:112932

REFERENCE 9: 138:112787

REFERENCE 10: 138:112590

=> d his

(FILE 'HOME' ENTERED AT 16:41:52 ON 16 FEB 2003)

```
                SET COST OFF

     FILE 'REGISTRY' ENTERED AT 16:42:06 ON 16 FEB 2003
                E FURFURAL/CN
L1            1 S E3
L2            1 S PHOSPHORIC ACID/CN
L3            1 S ACETIC ACID/CN

     FILE 'HCAPLUS' ENTERED AT 16:43:08 ON 16 FEB 2003
L4        14433 S L1
L5        18796 S FURFURAL
L6         8325 S FURALDEHYDE OR FURFURALDEHYDE OR FURFUROL# OR FUROLE OR ALPHA
L7         1207 S 2()(FURANCARBALDEHYDE OR FURANCARBONAL OR FURFURAL OR FURFURA
L8         1863 S 2 FURANCARBOXALDEHYDE
L9          158 S FURAN 2 CARBOXALDEHYDE
L10          24 S FURFURYLALDEHYDE
L11          25 S 2 FURAN CARBOXALDEHYDE
L12           9 S 2 FURYL ALDEHYDE
L13          51 S FURAN 2 ALDEHYDE
L14       28529 S L4-L13
L15         817 S L14 AND  PENTOSAN?
                E PENTOSAN/CT
                E E5+ALL
L16        1348 S E4
L17         172 S L14 AND L16
L18         817 S L15,L17
L19         110 S L18 AND ?PRESSUR?
L20         152 S L1/P AND L18
L21          30 S L20 AND L19
L22          38 S L20 AND STEAM?
L23          22 S L20 AND (?VAPOR? OR ?VAPOUR?)
L24          57 S L20 AND (TEMPERATURE OR HEAT? OR THERM?)
L25          85 S L21-L24
L26           1 S L25 AND DEPRESSUR?
                E REACTOR/CT
L27          58 S E9+NT AND L14
L28           8 S L27 AND ?PRESSUR?
                SEL DN AN 1 6
L29           2 S E1-E6
L30         610 S L14 AND ?SACCHARIDE?
                E POLYSACCHARIDES/CT
                E E3+ALL
L31         127 S E4,E3 AND L14
L32        1353 S L18,L30,L31
L33         241 S L32 AND L1/P
L34          39 S L33 AND ?PRESSUR?
L35          23 S L34 AND (STEAM? OR ?VAPOR? OR ?VAPOUR?)
L36          24 S L26,L29,L35
L37           3 S L36 AND (L2 OR L3 OR PHOSPHORIC ACID OR ACETIC ACID OR H2PO4)
L38          15 S L36 AND ?HEAT?
L39          15 S L34 AND ?STEAM?
L40          24 S L36-L39
                E ZEITSCH K/AU
L41          33 S E3-E9
                E EPOPL H/AU
L42           8 S L41 AND L14
L43           7 S L1/P AND L42
L44          29 S L40,L43
L45           1 S L42 NOT L44
L46          30 S L44,L45
L47          30 S L46 AND (?STEAM? OR ?HEAT? OR TEMPERATURE OR ?THERM? OR ?STEA
L48           6 S L47 AND (?BOIL? OR EBULL?)
L49           1 S L47 AND ?COMPRES?
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L50          30 S L47-L49
L51          30 S L50 AND L4-L50
                SEL HIT RN

     FILE 'REGISTRY' ENTERED AT 17:01:41 ON 16 FEB 2003
L52           2 S E1-E2

     FILE 'REGISTRY' ENTERED AT 17:02:22 ON 16 FEB 2003

=> fil hcaplus
FILE 'HCAPLUS' ENTERED AT 17:02:37 ON 16 FEB 2003
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FILE COVERS 1907 - 16 Feb 2003  VOL 138 ISS 8
FILE LAST UPDATED: 14 Feb 2003  (20030214/ED)

 This file contains CAS Registry Numbers for easy and accurate
 substance identification.


=> d l51 all hitstr tot

L51  ANSWER 1 OF 30  HCAPLUS  COPYRIGHT 2003 ACS
AN   2002:220569  HCAPLUS
DN   136:249386
TI   Gaseous acid catalysis
IN   Zeitsch, Karl J.
PA   Buzzard, Jonathan Leighton, S. Afr.; Steiner, Philipp D.
SO   PCT Int. Appl., 14 pp.
     CODEN: PIXXD2
DT   Patent
LA   English
IC   ICM  C07D307-50
CC   45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
FAN.CNT 1
     PATENT NO.        KIND  DATE           APPLICATION NO.  DATE
     ---------------   ----  --------       ---------------  --------
PI   WO 2002022593      A1   20020321       WO 2001-ZA146    20010914
         W:  AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ,
             DE, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP,
             KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN,
             MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM,
             TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD,
             RU, TJ, TM
         RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY,
             DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF,
             BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG
     DE 10045465       A1   20020328       DE 2000-10045465 20000914
     AU 2002024485     A5   20020326       AU 2002-24485    20010914
PRAI DE 2000-10045465  A    20000914
```

WO 2001-ZA146 W 20010914

AB A method of **gaseous** acid catalysis which finds particular applications in the manuf. of **furfural** includes the steps of introducing a solid **reactant** contg. .gtoreq.1 hydroxyl groups into a **reactor** (1); introducing **superheated steam** from a **superheater** (2) until the **temp.** within the **reactor** (1) is higher than that of the dew points of both water and the catalyst and the **reactant** is dry. The catalyst is then introduced into the **superheated steam** by **vaporizer** (3). Product **gas** formed is liquefied in condenser (4) and the condensate collected in a buffer tank (5). Sepn. plant 6 isolates the product **gas** and recovers the acid catalyst, preferably as its azeotrope with water, and recycles it into the **vaporizer.**

ST **gaseous** acid catalyst **furfural** prepn

IT Hydrolysis
(acid; **gaseous** acid catalysis)

IT Hydrolysis catalysts
(**gaseous** acid catalysis)

IT Carbohydrates, **reactions**
Pentosans
RL: RCT (Reactant); RACT (Reactant or reagent)
(**gaseous** acid catalysis)

IT 7647-01-0, Hydrochloric acid, uses
RL: CAT (Catalyst use); USES (Uses)
(**gaseous** acid catalysis)

IT **98-01-1P, Furfural,** preparation
RL: IMF (Industrial manufacture); PREP (Preparation)
(**gaseous** acid catalysis)

IT 57-50-1, Sugar, **reactions** 53106-52-8, **Pentose** 199297-32-0, **Pentose**
RL: RCT (Reactant); RACT (Reactant or reagent)
(**gaseous** acid catalysis)

RE.CNT 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

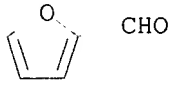
(1) Hamada, K; US 4154744 A 1979 HCAPLUS

(2) Wells, P; US 4001283 A 1977 HCAPLUS

IT **98-01-1P, Furfural,** preparation
RL: IMF (Industrial manufacture); PREP (Preparation)
(**gaseous** acid catalysis)

RN 98-01-1 HCAPLUS

CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 2 OF 30 HCAPLUS COPYRIGHT 2003 ACS

AN 2001:28054 HCAPLUS

DN 134:224289

TI **Gaseous** acid catalysis: An intriguing new process

AU **Zeitsch, Karl J.**

CS Koln, D-50935, Germany

SO Chemical Innovation (2001), 31(1), 40-44
CODEN: CINNFJ; ISSN: 1527-4799

PB American Chemical Society

DT Journal

LA English

CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
Section cross-reference(s): 67

AB A **gaseous** acid catalysis process for the prodn. of **furfural** from sugars (**pentose** or **pentosan**) using a H2O-HCl azeotrope is reported.
ST sugar dehydration water hydrochloric acid azeotrope; **furfural** prodn **gaseous** acid catalysis; hydrogen chloride water **gas** acid catalyst
IT Catalysis
(acid, **gaseous**; **gaseous** acid catalysis process prodn. of **furfural** from **pentose** or **pentosan**)
IT Water **vapor**
(**gaseous** hydrogen chloride-water catalyzed prodn. of **furfural** from **pentose**)
IT 199297-32-0, **Pentose**
RL: RCT (Reactant); RACT (Reactant or reagent)
(**gaseous** acid catalysis process prodn. of **furfural** from **pentose** or **pentosan**)
IT 7647-01-0, Hydrogen chloride, uses 7732-18-5, Water, uses
RL: CAT (Catalyst use); PRP (Properties); USES (Uses)
(**gaseous** hydrogen chloride-water catalyzed prodn. of **furfural** from **pentose**)
IT **98-01-1P**, **Furfural**, preparation
RL: IMF (Industrial manufacture); PREP (Preparation)
(**gaseous** hydrogen chloride-water catalyzed prodn. of **furfural** from **pentose**)
RE.CNT 9 THERE ARE 9 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE
(1) Bacelo, D; J Phys Chem 1999, V103, P4631 HCAPLUS
(2) Cobine, J; Gaseous Conductors 1958
(3) Coulson, C; Valence 1965
(4) Mason, S; Chemical Evolution 1992
(5) Pohl, R; Elektrizitatslehre 1967
(6) Saha, M; Phil Mag 1920, V40, P472
(7) Zeitsch, K; Chem Innov 2000, V30(4), P29 HCAPLUS
(8) Zeitsch, K; German Patent Application 100454658 2000
(9) Zeitsch, K; The Chemistry and Technology of Furfural and Its Many By-Products 2000
IT **98-01-1P**, **Furfural**, preparation
RL: IMF (Industrial manufacture); PREP (Preparation)
(**gaseous** hydrogen chloride-water catalyzed prodn. of **furfural** from **pentose**)
RN 98-01-1 HCAPLUS
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)

L51 ANSWER 3 OF 30 HCAPLUS COPYRIGHT 2003 ACS
AN 2000:738782 HCAPLUS
DN 133:298016
TI Procedure for the **gas**-phase production of **furfural** from the **pentoses** contained in sulfite waste pulping liquors using **steam** injection
IN **Zeitsch, Karl**
PA Germany
SO Ger. Offen., 4 pp.
CODEN: GWXXBX
DT Patent
LA German

IC ICM C07D307-48
ICS C07D307-50
CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
Section cross-reference(s): 27, 43, 48
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 19917178	A1	20001019	DE 1999-19917178	19990416
	WO 2000063488	A1	20001026	WO 2000-ZA72	20000414
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
	RW: GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
	BR 2000009815	A	20020108	BR 2000-9815	20000414
	EP 1171665	A1	20020116	EP 2000-940001	20000414
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	NO 2001005031	A	20011211	NO 2001-5031	20011016
PRAI	DE 1999-19917178	A	19990416		
	WO 2000-ZA72	W	20000414		

AB **Furfural** is prepd. in high yield and selectivity from the **gas**-phase **reaction** of **pentoses** found in sulfite waste liquors which are **heated** by **steam** injection in a tubular **reactor**, the low-**boiling** products distd. and **furfural** removed, and the residue cooled by **depressurization**. A process flow diagram is presented.

ST **furfural** manuf sulfite waste liquor **steam** injection; **pentose** sulfite waste liquor conversion prepn **furfural**; pulping liquor sulfite manuf **furfural**

IT **Steam**
(procedure for the **gas**-phase prodn. of **furfural** from the **pentoses** contained in sulfite waste liquors using **steam** injection)

IT Distillation
(procedure for the **gas**-phase prodn. of **furfural** from the **pentoses** contained in sulfite waste liquors using **steam** injection and)

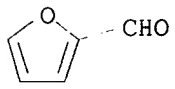
IT **Pentoses**
RL: RCT (Reactant); RACT (Reactant or reagent)
(sulfite waste liquor-contg.; procedure for the **gas**-phase prodn. of **furfural** from the **pentoses** contained in sulfite waste liquors using **steam** injection)

IT Pulping liquors, **reactions**
RL: RCT (Reactant); RACT (Reactant or reagent)
(sulfite, **pentose**-contg.; procedure for the **gas**-phase prodn. of **furfural** from the **pentoses** contained in sulfite waste liquors using **steam** injection)

IT 7439-97-6, Mercury, processes
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(procedure for the **gas**-phase prodn. of **furfural** from the **pentoses** contained in sulfite waste liquors using **steam** injection)

IT **98-01-1P, Furfural**, preparation
RL: IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PREP (Preparation); PROC (Process)
(procedure for the **gas**-phase prodn. of **furfural** from the **pentoses** contained in sulfite waste liquors using

steam injection)
IT **98-01-1P, Furfural,** preparation
RL: IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PREP (Preparation); PROC (Process)
(procedure for the **gas**-phase prodn. of **furfural** from the **pentoses** contained in sulfite waste liquors using **steam** injection)
RN 98-01-1 HCAPLUS
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)

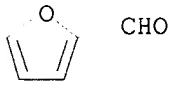


L51 ANSWER 4 OF 30 HCAPLUS COPYRIGHT 2003 ACS
AN **2000:573784** HCAPLUS
DN **133:165426**
TI Process for the manufacture of **furfural**
IN **Zeitsch, Karl J.**
PA Steiner, Philipp Daniel, S. Afr.
SO PCT Int. Appl., 15 pp.
CODEN: PIXXD2
DT Patent
LA English
IC ICM C07D307-50
CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
Section cross-reference(s): 27
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2000047569	A1	20000817	WO 2000-ZA24	20000211
	W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
	RW: GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
	DE 19905655	A1	20000817	DE 1999-19905655	19990211
	EP 1161426	A1	20011212	EP 2000-912231	20000211
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	BR 2000008143	A	20020312	BR 2000-8143	20000211
PRAI	DE 1999-19905655	A	19990211		
	WO 2000-ZA24	W	20000211		

AB The process is carried out by charging a **reactor** with **pentosan**-contg. material, **heating** by introduction of **pressurized steam** to a 1st perdetd. **temp.** closing the inlet valve of the **reactor**, and subjecting the charge to a gradual redn. of **pressure** until a 2nd predetd. **temp.** is attained, the **depressurization** being at a rate sufficient to maintain the liq. phase within the **reactor** in a constantly **ebullient** state. An illustration of the delayed **decompression** process for the prodn. of **furfural** is given.
ST conversion **pentosan furfural; decompression** process prodn **furfural**
IT **Reactors**

(process for the manuf. of **furfural**)
IT **Pentosans**
RL: RCT (Reactant); RACT (Reactant or reagent)
(process for the manuf. of **furfural**)
IT **98-01-1P, Furfural**, preparation
RL: IMF (Industrial manufacture); PREP (Preparation)
(process for the manuf. of **furfural**)
RE.CNT 8 THERE ARE 8 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE
(1) Bertin & Cie; WO 8100407 A 1981 HCAPLUS
(2) F S Market Spol S R O; WO 9625553 A 1996 HCAPLUS
(3) Friedr Krupp Gmbh; DE 3842825 A 1989 HCAPLUS
(4) Jednote Zemedelske Druzstvo Jana Cerneho Se Sidlem; EP 0346836 A 1989 HCAPLUS
(5) Kiminki, K; US 4029515 A 1977 HCAPLUS
(6) Knauth, H; DE 3139188 C 1983 HCAPLUS
(7) Krasd Poly; SU 1225841 A 1986 HCAPLUS
(8) Medeiros, D; US 4533743 A 1985 HCAPLUS
IT **98-01-1P, Furfural**, preparation
RL: IMF (Industrial manufacture); PREP (Preparation)
(process for the manuf. of **furfural**)
RN 98-01-1 HCAPLUS
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)

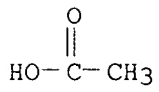


L51 ANSWER 5 OF 30 HCAPLUS COPYRIGHT 2003 ACS
AN 2000:369496 HCAPLUS
DN 132:336083
TI Manufacture of **furfurol** and **acetic acid** from plant sources
IN Vedernikovs, Nikolajs
PA Latvia
SO Latv., 15 pp.
CODEN: LAXXF6
DT Patent
LA Russian
IC ICM C07D307-50
ICS C07C053-08
CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
Section cross-reference(s): 27
FAN.CNT 1

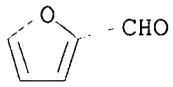
	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	LV 12131	B	19981120	LV 1997-230	19971114
PRAI	LV 1997-230		19971114		

AB The title compds. are manufd. by treating comminuted plant sources contg. **pentosans**, e.g., hardwood, corn stalks, sunflower seed shells, etc., with **superheated steam** at 200-250.degree. under **pressure** (0.7-1.4 MPa), in the presence of inorg. salts comprising cations having charge .gtoreq.2, specifically ZnSO4 and/or A12(SO4)3. The amts. of inorg. salt catalyst, are reduced by use of salt solns. with satn. degree 20-90% in an amt. of .ltoreq.15% based on dry plant material.
ST **furfurol** manuf **pentosan** contg plant; corn stalk
furfurol manuf zinc aluminum sulfate catalyst
IT Straw
Straw
(corn; manuf. of **furfurol** and **acetic acid**

from plant sources contg. **pentosans**)
IT **Pentosans**
RL: MSC (Miscellaneous)
(manuf. of **furfurol** and **acetic acid** from plant sources contg.)
IT Corn
Corn
(straw; manuf. of **furfurol** and **acetic acid** from plant sources contg. **pentosans**)
IT **Steam**
(**superheated**; manuf. of **furfurol** and **acetic acid** from plant sources contg. **pentosans**)
IT 7733-02-0, Zinc sulfate 10043-01-3, Aluminum sulfate
RL: CAT (Catalyst use); USES (Uses)
(manuf. of **furfurol** and **acetic acid** from plant sources contg. **pentosans**)
IT **64-19-7P**, **Acetic acid**, preparation
98-01-1P, **Furfurol**, preparation
RL: IMF (Industrial manufacture); PREP (Preparation)
(manuf. of **furfurol** and **acetic acid** from plant sources contg. **pentosans**)
IT **64-19-7P**, **Acetic acid**, preparation
98-01-1P, **Furfurol**, preparation
RL: IMF (Industrial manufacture); PREP (Preparation)
(manuf. of **furfurol** and **acetic acid** from plant sources contg. **pentosans**)
RN 64-19-7 HCAPLUS
CN Acetic acid (7CI, 8CI, 9CI) (CA INDEX NAME)



RN 98-01-1 HCAPLUS
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 6 OF 30 HCAPLUS COPYRIGHT 2003 ACS
AN 2000:254501 HCAPLUS
DN 133:6139
TI **Furfural** production needs chemical innovation
AU **Zeitsch, Kark J.**
CS Koln, Germany
SO Chemical Innovation (2000), 30(4), 29-32
CODEN: CINNFJ; ISSN: 1527-4799
PB American Chemical Society
DT Journal
LA English
CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
AB A consideration regarding an increase of **furfural** yield in industrial prodn. is given. Yields of **furfural** approaching 100% can be obtained by avoiding H2SO4 to prevent sulfonation losses and by bringing the system to **boiling** and maintaining this state throughout the digestion process.
ST **furfural** yield industrial manuf sulfuric acid; **pentose**

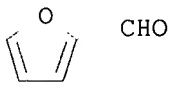
redn furancarboxaldehyde process optimization
IT **98-01-1P, Furfural**, preparation
RL: IMF (Industrial manufacture); PREP (Preparation)
(increasing **furfural** yield in industrial prodn.)
IT 7664-93-9, Sulfuric acid, uses
RL: NUU (Other use, unclassified); USES (Uses)
(increasing **furfural** yield in industrial prodn.)
IT 199297-32-0, **Pentose**
RL: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(increasing **furfural** yield in industrial prodn.)
RE.CNT 21 THERE ARE 21 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE
(1) Brownlee, H; Ind Eng Chem 1927, V19, P422 HCAPLUS
(2) Brownlee, H; Ind Eng Chem 1948, V40, P201 HCAPLUS
(3) Cox, W; Fearsome Creatures of the Lumberwoods 1984
(4) Dehn, W; J Am Chem Soc 1933, V55, P4284 HCAPLUS
(5) Derbyshire, V; Proc Natl Acad Sci USA 1998, V95, P1356 HCAPLUS
(6) Evans, D; J Am Chem Soc 1975, V97, P4765 HCAPLUS
(7) Evans, D; J Am Chem Soc 1978, V100, P2742
(8) Haseltine, J; J Am Chem Soc 1989, V111, P7638 HCAPLUS
(9) Hughes, E; J Res Natl Bur Stand 1938, V21, P327 HCAPLUS
(10) Hurd, C; J Am Chem Soc 1932, V54, P317 HCAPLUS
(11) Kishore, N; J Chem Thermodyn 1999, V31, P211 HCAPLUS
(12) Perler, F; Nucleic Acids Res 1994, V22, P1125 HCAPLUS
(13) Perler, F; Nucleic Acids Res, www.neb.com/inteins/int_mech.html 2000, V28, P344 HCAPLUS
(14) Root, D; For Prod J 1959, V9, P158 HCAPLUS
(15) Sabongi, G; Chemical Triggering 1987
(16) Smith, A; J Med Chem 1996, V39, P2103 HCAPLUS
(17) Stryer, L; Biochemistry 4th ed 1995, P864
(18) Vollmert, B; Polymer Chemistry V197, P34
(19) Woodward, R; Perspectives in Organic Chemistry 1956, P176
(20) Zeitsch, K; German patent application 19905655.2 1999
(21) Zeitsch, K; PCT patent application 2A00/00024 2000
IT **98-01-1P, Furfural**, preparation
RL: IMF (Industrial manufacture); PREP (Preparation)
(increasing **furfural** yield in industrial prodn.)
RN 98-01-1 HCAPLUS
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)

L51 ANSWER 7 OF 30 HCAPLUS COPYRIGHT 2003 ACS
AN 2000:177281 HCAPLUS
DN 132:309937
TI Fortuitous radical **reactions** in **furfural** and charcoal **reactors**
AU **Zeitsch, Karl J.**
CS Cologne, D-50935, Germany
SO Chemical Innovation (2000), 30(3), 35-38
CODEN: CINNFJ; ISSN: 1527-4799
PB American Chemical Society
DT Journal; General Review
LA English
CC 45-0 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
AB A review with 6 refs. on formation of byproducts of diacetyl and 2,3-pentanedione by radical **reactions** in **furfural**

prepn., and charcoal **reactors** used in this process.
ST review **furfural** charcoal **reactor**
IT Charcoal
RL: MSC (Miscellaneous)
(fortuitous radical **reactions** in **furfural** and charcoal **reactors**)
IT **98-01-1**, **Furfural**, miscellaneous
RL: MSC (Miscellaneous)
(fortuitous radical **reactions** in **furfural** and charcoal **reactors**)
RE.CNT 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE
(1) Blacet, F; Discuss Faraday Soc 1973, V14, P70
(2) Franz, G; Ullmann's Encyclopedia of Industrial Chemistry, 5th ed 1991, VA18, P261
(3) Hagglund, E; Chemistry of Wood 1951, P190
(4) Hobbs, C; Kirk-Othmer Encyclopedia of Chemical Technology, 4th ed 1998, V13, P682
(5) Larkin, D; J Org Chem 1990, V55, P1563 HCAPLUS
(6) McDowell, C; J Chem Soc 1949, P2208 HCAPLUS
IT **98-01-1**, **Furfural**, miscellaneous
RL: MSC (Miscellaneous)
(fortuitous radical **reactions** in **furfural** and charcoal **reactors**)
RN 98-01-1 HCAPLUS
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)

L51 ANSWER 8 OF 30 HCAPLUS COPYRIGHT 2003 ACS
AN 1999:589078 HCAPLUS
DN 131:259286
TI Extractive Condensation: A New Separation Process
AU **Zeitsch, K. J.**
CS Cologne, D-50935, Germany
SO Industrial & Engineering Chemistry Research (1999), 38(10), 4123-4124
CODEN: IECRED; ISSN: 0888-5885
PB American Chemical Society
DT Journal
LA English
CC 48-1 (Unit Operations and Processes)
AB A new highly selective **vapor**-phase extn. process is described. Hydrogen bonding between a scavenging extractant and the substance to be extd. results in a high-**boiling** complex forming fog droplets readily separable from the remaining **vapor**. The process is exemplified by the extn. of acetic acid from the predominantly aq. **vapor** stream of **furfural reactors**. Triethylamine is used as the extractant.
ST extractive condensation acetic acid **furfural** triethylamine
IT Condensation (physical)
Extraction
(extractive condensation in acetic acid extn. from aq. **vapor** stream of **furfural** using triethylamine)
IT 121-44-8, Triethylamine, uses
RL: MOA (Modifier or additive use); USES (Uses)
(extn. of acetic acid from aq. **vapor** stream of **furfural** using triethylamine by extractive condensation)
IT 64-19-7P, Acetic acid, preparation **98-01-1P**, **Furfural**,

preparation
RL: PUR (Purification or recovery); PREP (Preparation)
(extn. of acetic acid from aq. **vapor** stream of **furfural** using triethylamine by extractive condensation)
RE.CNT 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE
(1) March, J; Advanced Organic Chemistry 1992
(2) Zeitsch, K; DE 40251284 P 1990
IT **98-01-1P, Furfural**, preparation
RL: PUR (Purification or recovery); PREP (Preparation)
(extn. of acetic acid from aq. **vapor** stream of **furfural** using triethylamine by extractive condensation)
RN 98-01-1 HCAPLUS
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)

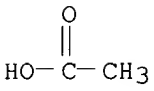


L51 ANSWER 9 OF 30 HCAPLUS COPYRIGHT 2003 ACS
AN 1998:716425 HCAPLUS
DN 129:277653
TI Process for producing of **furfural** and **acetic acid**
IN Vedernikovs, Nikolajs
PA Latvia
SO Latv., 11 pp.
CODEN: LAXXF6
DT Patent
LA Russian
IC C07D307-50; C07C053-08
CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
Section cross-reference(s): 43
FAN.CNT 1

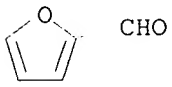
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI LV 11950	B	19980320	LV 1995-310	19951012
PRAI LV 1995-310		19951012		

AB With the aim to reduce the amt. of the catalyst and improve environmental friendliness of the process, a new catalyst compn. is disclosed for **furfural** and **acetic acid** prodn. from **pentosan**-contg. vegetable raw material, i.e., corncob, comminuted wood or sawdust. The catalyst is an aq. soln. contg. 0.3-5.0% a carboxylic acid, 0.5-75.0% sulfuric acid, and/or 0.2-35.0% a salt or salt mixt., contg. cations with a charge .gtoreq. 2 (aluminum or zinc sulfates). The overall amt. of the catalyst is .ltoreq. 20 wt. % dry raw material. The raw material is sprinkled with the catalyst soln. and treated with water **vapor** in a continuous or periodic **reactor** under 0.5-1.1 MPa **pressure, vapor temp.** 180-250.degree., processing time 90-120 min. **Furfural** and **acetic acid** yields are 82 and 91% of the theor., resp.
ST **furfural** manuf **pentosan** vegetable raw material; **acetic acid** manuf **pentosan** raw material; carboxylic acid hydrolysis catalyst **furfural** prodn; sulfuric acid hydrolysis catalyst **furfural** prodn
IT Hydrolysis catalysts
(acid; process and catalytic soln. for producing of **furfural** and **acetic acid**)
IT Wood

(after tannin extn., comminuted; process and catalytic soln. for producing of **furfural** and **acetic acid**)
IT Dehydration catalysts
(process and catalytic soln. for producing of **furfural** and **acetic acid**)
IT Carboxylic acids, uses
RL: CAT (Catalyst use); USES (Uses)
(process and catalytic soln. for producing of **furfural** and **acetic acid**)
IT **Pentosans**
RL: RCT (Reactant); RACT (Reactant or reagent)
(process and catalytic soln. for producing of **furfural** and **acetic acid**)
IT 64-18-6, Formic acid, uses 7664-93-9, Sulfuric acid, uses 7733-02-0, Zinc sulfate 10043-01-3, Aluminum sulfate
RL: CAT (Catalyst use); USES (Uses)
(process and catalytic soln. for producing of **furfural** and **acetic acid**)
IT **64-19-7P**, **Acetic acid**, preparation
98-01-1P, **Furfural**, preparation
RL: IMF (Industrial manufacture); PREP (Preparation)
(process and catalytic soln. for producing of **furfural** and **acetic acid**)
IT **64-19-7P**, **Acetic acid**, preparation
98-01-1P, **Furfural**, preparation
RL: IMF (Industrial manufacture); PREP (Preparation)
(process and catalytic soln. for producing of **furfural** and **acetic acid**)
RN 64-19-7 HCAPLUS
CN Acetic acid (7CI, 8CI, 9CI) (CA INDEX NAME)



RN 98-01-1 HCAPLUS
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 10 OF 30 HCAPLUS COPYRIGHT 2003 ACS
AN 1995:582476 HCAPLUS
DN 122:317229
TI Hydrolysis of **pentosan**-rich plant materials
IN Maciejewski, Zdzislaw; Lachman, Ignacy; Bronikowski, Krzysztof; Gil, Tadeusz; Brunka, Jerzy; Witek, Jan; Grzonka, Jan
PA Zaklady Plyt Pilsniowych, Pol.; Instytut Ciezkiej Syntezy Organicznej "BLACHOWNIA"; Biuro Projektow i Realizacji Inwestycji Przemyslu Syntezy Chemicznej "PROSYNCHEM"
SO Pol., 6 pp.
CODEN: POXXA7
DT Patent
LA Polish
IC ICM C07D307-50
CC 43-9 (Cellulose, Lignin, Paper, and Other Wood Products)
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	PL 159178	B1	19921130	PL 1987-265654	19870511
PRAI	PL 1987-265654		19870511		

AB **Furfural** is extd. from crumbled **pentosan**-rich plant materials by impregnating the materials to 30-50% with water contg. .ltoreq.4% HOAc or weak org. acid in a feeder equipped with a helical feeding screw, exposing the impregnated materials to **steam** under **pressure** in a hydrolyzer, passing the hydrolyzed materials through a 2nd feeder where the plant material is impregnated to 50-70% with strong acid or strong acid salts, and exposing the materials a 2nd time to **steam** under **pressure** in the hydrolyzer.

ST **furfural** extn wood hydrolysis

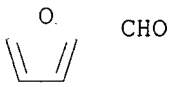
IT Hydrolysis
Wood
(hydrolysis of **pentosan**-rich plant materials for extn. of **furfural**)

IT **98-01-1P, Furfural**, preparation
RL: PUR (Purification or recovery); PREP (Preparation)
(hydrolysis of **pentosan**-rich plant materials for extn. of **furfural**)

IT **98-01-1P, Furfural**, preparation
RL: PUR (Purification or recovery); PREP (Preparation)
(hydrolysis of **pentosan**-rich plant materials for extn. of **furfural**)

RN 98-01-1 HCAPLUS

CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 11 OF 30 HCAPLUS COPYRIGHT 2003 ACS

AN 1990:589821 HCAPLUS

DN 113:189821

TI Method of producing **furfural** and yeast nutrients

IN Shishakov, E.; Shkut, V. M.; Ruchai, N. S.; Dernovich, A. V.; Usmanova, G. Sh.; Talapin, V. I.; Aptseshko, M. I.

PA Belorussian Technological Institute, USSR

SO U.S.S.R.
From: Otkrytiya, Izobret. 1989, (34), 123.
CODEN: URXXAF

DT Patent

LA Russian

IC ICM C12N001-22
ICS C07D307-50

CC 16-9 (Fermentation and Bioindustrial Chemistry)

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	SU 1507789	A1	19890915	SU 1987-4383909	19871230
PRAI	SU 1987-4383909		19871230		

AB **Furfural** and yeast nutrients are obtained by **vapor**-phase treatment of **pentosan**-contg. raw material in the presence of a catalyst with simultaneous distn. of **furfural**, hydrolysis of the lignocellulose residue with H_2SO_4, sepn. of the ppt., and subsequent use of the supernatant liq. as a nutrient medium for yeast. The yield of the target products is increased by using nitroammophos or ammophos as the catalyst at 3-10% soln. in H_2SO_4 3-10% soln. at a 0.2-0.3 hydromodulus at 160-185.degree. for 60-100 min and 0.6-1.1 mPa; and by

treating the lignocellulose residue, prior to hydrolysis, with H2O or with lyuter [sic], following distn. of **furfural**, at a 1-4 hydromodulus at 170-185.degree. and 0.8-1.1 MPa **pressure** for 10-30 min.

ST **furfural** isolation **pentosan**; yeast nutrient prepn **pentosan**

IT Nutrients
(for yeast, prepn. of **furfural** and, from **pentosans**)

IT **Pentosans**
RL: PREP (Preparation)
(**furfural** and yeast nutrient prepn. from)

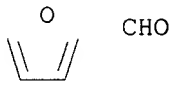
IT Yeast
(nutrients, prepn. of **furfural** and, from **pentosans**)

IT **98-01-1P, 2-Furancarboxaldehyde**, preparation
RL: PREP (Preparation)
(prepn. of yeast nutrients and, from **pentosans**)

IT **98-01-1P, 2-Furancarboxaldehyde**, preparation
RL: PREP (Preparation)
(prepn. of yeast nutrients and, from **pentosans**)

RN 98-01-1 HCAPLUS

CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 12 OF 30 HCAPLUS COPYRIGHT 2003 ACS

AN 1989:556440 HCAPLUS

DN 111:156440

TI Process and apparatus for the manufacture of **furfural**

IN **Zeitsch, Karl Joachim**

PA Krupp, Fried., G.m.b.H., Fed. Rep. Ger.

SO Ger. Offen., 9 pp.
CODEN: GWXXBX

DT Patent

LA German

IC ICM C07D307-50
ICS C13G001-00

CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
Section cross-reference(s): 27, 47

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 3842825	A1	19890720	DE 1988-3842825	19881220
	DE 3842825	C2	19910124		
	FI 8806014	A	19890709	FI 1988-6014	19881228
	ZA 8900080	A	19891025	ZA 1989-80	19890105
	CH 678183	A	19910815	CH 1989-34	19890105
	US 4912237	A	19900327	US 1989-295314	19890109
PRAI	DE 1988-3800317		19880108		
	DE 1988-3842825		19881220		

AB **Furfural** is prepd. in high yield by the H2SO4 hydrolysis and dehydration of **pentosan**-contg. materials (e.g., bagasse, straw, wood waste, etc.) in an app. in which the comminuted raw material in suspension with dil. H2SO4 is continuously fed into a flow-through **reactor** (170-230.degree.), the **temp**. raised by mixing the feed suspension with high-**pressure steam**, the exiting suspension fed into an expansion **evaporator** (operated at .ltoreq.760 torr), and the **furfural**-H2O-**steam** mixt. is directly condensed in a conventional condensation app. The app. produces

acid-free residues and does not require the long residence times of prior-art **furfural** manufg. app. A process schematic is presented.

ST **furfural** manuf **pentosan** hydrolysis dehydration; sulfuric acid hydrolysis **pentosan** material; bagasse hydrolysis dehydration **furfural** manuf; straw hydrolysis dehydration **furfural** manuf; wood hydrolysis dehydration **furfural** manuf

IT **Pentosans**
RL: USES (Uses)
(hydrolysis and dehydration of, **furfural** manuf. by, app. for)

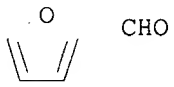
IT 7664-93-9P, Sulfuric acid, **reactions**
RL: RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)
(hydrolysis and dehydration by, of **pentosans** in **furfural** manuf., app. for)

IT **98-01-1P, Furfural**, preparation
RL: PREP (Preparation)
(manuf. of, by hydrolysis and dehydration of **pentosan**-contg. materials, app. for)

IT **98-01-1P, Furfural**, preparation
RL: PREP (Preparation)
(manuf. of, by hydrolysis and dehydration of **pentosan**-contg. materials, app. for)

RN 98-01-1 HCAPLUS

CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 13 OF 30 HCAPLUS COPYRIGHT 2003 ACS

AN 1988:71732 HCAPLUS

DN 108:71732

TI Production of **furfural** and culture medium for fodder yeasts from **pentosan**-containing biological materials

IN Morozov, E. F.; Shishakov, E. P.; Shkut, V. M.; Ruchai, N. S.; Kebich, M. S.; Kolomeets, V. I.; Samsonov, P. I.

PA Belorussian Technological Institute, USSR

SO U.S.S.R.
From: Otkrytiya, Izobret. 1987, (30), 112.
CODEN: URXXAF

DT Patent

LA Russian

IC ICM C12N001-22

ICI C12N001-22, C12R001-72

CC 9-11 (Biochemical Methods)
Section cross-reference(s): 27

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
SU 1330155	A1	19870815	SU 1984-3813601	19841115

PRAI SU 1984-3813601 19841115

AB **Vapor**-phase treatment of **pentosan**-contg. raw material with **heating** and at elevated **pressure** in the presence of a catalyst results in distn. of **furfural**. The cellolignin residue is hydrolyzed, the hydrolyzate is neutralized, and a ppt. is sepd. with subsequent use of the supernatant liq. as a culture medium for the growth of feed yeasts. The yield of products is increased by using nitroammophoska as the catalyst in a 1-6% concn. based on dry raw material, and treating the **pentosan**-contg. raw material for

60-100 min at 180-200.degree. and 1.0-1.6 MPa **pressure**.
ST **furfural** manuf **pentosan** nitroammophoska; cellolignin hydrolyzate culture medium yeast
IT Culture media
(for yeast, manuf. of, from lignocellulose)
IT **Pentosans**
RL: ANST (Analytical study)
(**furfural** and yeast culture medium manuf. from biol. materials contg.)
IT Yeast
(fodder, culture medium for, manuf. of, from lignocellulose)
IT Fertilizers
RL: CAT (Catalyst use); USES (Uses)
(nitrogen-phosphorus-potassium, as catalyst, in **furfural** manuf. from **pentosan**-contg. biol. materials)
IT 7440-09-7P 7723-14-0P 7727-37-9P
RL: PREP (Preparation)
(fertilizers, nitrogen-phosphorus-potassium, as catalyst, in **furfural** manuf. from **pentosan**-contg. biol. materials)
IT **98-01-1P**, **Furfural**, preparation
RL: PREP (Preparation)
(manuf. of, from **pentosan**-contg. biol. materials)
IT 11132-73-3D, Lignocellulose, hydrolyzates
RL: ANST (Analytical study)
(yeast culture medium manuf. from)
IT **98-01-1P**, **Furfural**, preparation
RL: PREP (Preparation)
(manuf. of, from **pentosan**-contg. biol. materials)
RN 98-01-1 HCAPLUS
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)

L51 ANSWER 14 OF 30 HCAPLUS COPYRIGHT 2003 ACS
AN 1986:593248 HCAPLUS
DN 105:193248
TI Continuous **pressureless** production of 2-**furaldehyde**
IN Rendos, Frantisek; Zelnik, Andrej; Blazej, Anton; Pajtik, Jozef; Kosik, Martin; Oltus, Eugen
PA Czech.
SO Czech., 4 pp.
CODEN: CZXXA9
DT Patent
LA Czech
IC C07D307-50
CC 43-9 (Cellulose, Lignin, Paper, and Other Wood Products)
Section cross-reference(s): 27, 44
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI CS 218738	B	19830225	CS 1981-891	19810206
PRAI CS 1981-891		19810206		

AB Plant materials contg. **pentosans**, such as wood chips, straw, corn cobs, or bagasse were prehydrolyzed with 0.5-2.5% H2SO4 0.2-1% HCl, and the mixt. was **boiled** with 5-15% HCl to dehydrate **pentoses** to 2-**furaldehyde**, which was sepd. by **steam** distn. and the HCl was recycled. Yields were 22-42%, based on dry wt. of starting hydrolyzate, depending on the material used.

ST dehydration **pentose** furfuryl hydrochloric acid; **furaldehyde** prodn **pentosan** plant material; **furfural** prodn **pentosan** hydrolysis; corn cob hydrolysis furnancarboxaldehyde; bagasse hydrolysis furancarboxaldehyde; wood hydrolysis furancarboxyaldehyde

IT **Pentoses**
RL: RCT (Reactant); RACT (Reactant or reagent)
(dehydration of, to **furaldehyde**, continuous)

IT Bagasse
(**furaldehyde** prodn. from, continuous, by **pressureless** hydrolysis)

IT Corncob
Straw
(**furaldehyde** prodn. from, continuous, by **pressureless** hydrolysis method)

IT Dehydration catalysts
(hydrochloric acid, for **pentoses** to **furaldehyde**)

IT Dehydration, chemical
(of **pentoses** to **furaldehyde**)

IT Hydrolysis
(pre-, of **pentosan**-contg. plant materials, in continuous **furaldehyde** prodn.)

IT **Pentosans**
RL: USES (Uses)
(prehydrolysis of, in **furaldehyde** prodn., continuous and **pressureless**)

IT Wood
(chips, **furaldehyde** prodn. from, continuous, by **pressureless** hydrolysis method)

IT 7647-01-0, uses and miscellaneous
RL: CAT (Catalyst use); USES (Uses)
(dehydration catalysts, for **pentoses** in **furaldehyde** prodn.)

IT 7664-93-9, **reactions**
RL: RCT (Reactant); RACT (Reactant or reagent)
(prehydrolysis of **pentosan**-contg. plant material by, in continuous **furaldehyde** prodn.)

IT **98-01-1P**, preparation
RL: PREP (Preparation)
(prodn. of, from **pentosan**-contg. plant material, continuous)

IT **98-01-1P**, preparation
RL: PREP (Preparation)
(prodn. of, from **pentosan**-contg. plant material, continuous)

RN 98-01-1 HCAPLUS

CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)

L51 ANSWER 15 OF 30 HCAPLUS COPYRIGHT 2003 ACS

AN 1985:80642 HCAPLUS

DN 102:80642

TI Apparatus and method for producing **furfural** from spent acid liquors in the production of cellulose

IN Huber, Johann

PA Chemiefaser Lenzing A.-G., Austria

SO Eur. Pat. Appl., 12 pp.
CODEN: EPXXDW

DT Patent

LA German
IC C07D307-50; D21C011-00
CC 43-6 (Cellulose, Lignin, Paper, and Other Wood Products)
Section cross-reference(s): 27
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 124507	A1	19841107	EP 1984-890075	19840426
	EP 124507	B1	19890628		
	R: DE, FR, IT, SE				
	AT 8301589	A	19840515	AT 1983-1589	19830502
	AT 376717	B	19841227		
PRAI	AT 1983-1589		19830502		

AB **Furfural** [**98-01-1**] is prepd. by stepwise **heating** of spent sulfite liquor in **vapor** condensers to dehydrate **pentoses** and **pentosans**, expansion at lower **temp.**, and distg. **furfural** from the condensate. Thus, 140 m3 spent liquor from the Mg(HSO3)2 process, contg. .apprx.30 g xylose/L, was **heated** to 210.degree. under **pressure** and expanded at 195.degree. to give .apprx.25 m2 condensate contg. 2000 kg **furfural** (.apprx.74.5% yield based on xylose).
ST **furfural** sulfite liquor spent; dehydration xylose sulfite liquor
IT Dehydration, chemical
(**thermal**, of **pentoses** to **furfural**, in spent sulfite liquors)
IT Sulfite liquors and Cooking liquors, uses and miscellaneous
RL: USES (Uses)
(spent, **furfural** prodn. from)
IT **98-01-1P**, preparation
RL: PREP (Preparation)
(manuf. of, from spent sulfite liquor)
IT **98-01-1P**, preparation
RL: PREP (Preparation)
(manuf. of, from spent sulfite liquor)
RN 98-01-1 HCAPLUS
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)

L51 ANSWER 16 OF 30 HCAPLUS COPYRIGHT 2003 ACS
AN 1984:409015 HCAPLUS
DN 101:9015
TI 2-**Furaldehyde**
IN Zelnik, Andrej; Rendos, Frantisek; Blazej, Anton; Pajtik, Jozef; Kosik, Martin
PA Czech.
SO Czech., 3 pp.
CODEN: CZXXA9
DT Patent
LA Slovak
IC C07D307-50
CC 43-9 (Cellulose, Lignin, Paper, and Other Wood Products)
Section cross-reference(s): 27
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	CS 210733	B	19820129	CS 1980-4713	19800702
PRAI	CS 1980-4713		19800702		

AB A continuous process for manuf. of **2-furfuraldehyde** (I) [**98-01-1**] at atm. **pressure** comprises hydrolysis of (oligo)**pentoses**, present in sulfite liquors and **pentose**-contg. wastes from manuf. of D-xylose from cellulosic materials (e.g., wood waste, such as chips, corn cobs, straw, etc.) with 1% H2SO4 in a fluidized bed at 220.degree. followed by dehydration of the hydrolyzate. The fluidized state of the inorg. carrier (SiO2) is induced by mech. vibrations with simultaneous **heating** and the liquor to be hydrolyzed is sprayed on the surface of the carrier particles. The I **vapors** together with water **vapor** are condensed and I is isolated by rectification.

ST **furfural** manuf **pentosan** soln; fluidized bed
furfural manuf

IT **Pentoses**
RL: RCT (Reactant); RACT (Reactant or reagent)
(from cellulosic materials, hydrolysis of, in fluidized bed at atm. **pressure**, **furfural** manuf. by)

IT Fluidized beds and systems
(**furfural** manuf. in, at atm. **pressure**, from (oligo) **pentose**-contg. liqs.)

IT **Oligosaccharides**
RL: USES (Uses)
(**pentosans**, from cellulosic materials, hydrolysis of, in fluidized beds at atm. **pressure**, **furfural** manuf. by)

IT Hydrolysis
(acid, of (oligo)**pentose**-contg. liqs., in fluidized bed at atm. **pressure**, in **furfural** manuf.)

IT **98-01-1P**, preparation
RL: PREP (Preparation)
(manuf. of, in fluidized bed, at atm. **pressure**, from (oligo) **pentose**-contg. liqs.)

IT **98-01-1P**, preparation
RL: PREP (Preparation)
(manuf. of, in fluidized bed, at atm. **pressure**, from (oligo) **pentose**-contg. liqs.)

RN 98-01-1 HCAPLUS
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)

L51 ANSWER 17 OF 30 HCAPLUS COPYRIGHT 2003 ACS
AN 1980:41741 HCAPLUS
DN 92:41741
TI **Furfural**
IN Maciejewski, Zdzislaw; Wojciechowski, Jerzy; Rutkowska, Elzbieta; Torbicz, Kazimierz; Wilczynski, Jerzy; Lachman, Ignacy; Spaczynska, Grazyna; Landek, Rudolf
PA Instytut Ciezkiej Syntezy Organicznej "Blachownia", USSR
SO U.S.S.R.
From: Otkrytiya, Izobret., Prom. Obraztsy, Tovarnye Znaki 1979, (31), 232.
CODEN: URXXAF
DT Patent
LA Russian
IC C07D307-50
CC 27-6 (Heterocyclic Compounds (One Hetero Atom))
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE

PI	SU 682130	D	19790825	SU 1975-2145956	19750623
PRAI	SU 1975-2145956		19750623		

AB **Furfural** was prepd. by **thermal** hydrolysis of **pentosan**-contg. plant raw materials in the presence of H2SO4 at high **pressure** followed by distn. of the **furfural** condensate. The **heat** from the burning of the waste products was used for the **thermal** hydrolysis. The process was improved by **heating** lignocellulose at 200-300.degree. with **superheated steam** and combining the **furfural** condensate with the condensate from the **thermal** hydrolysis stage.

ST **furfural; thermal** hydrolysis **pentosan**

IT Hydrolysis
(of **pentosan, furfural** from)

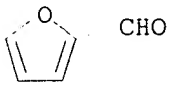
IT **Pentosans**
RL: RCT (Reactant); RACT (Reactant or reagent)
(**thermal** hydrolysis of)

IT **98-01-1P**, preparation
RL: PREP (Preparation)
(by **thermal** hydrolysis of **pentosan**)

IT **98-01-1P**, preparation
RL: PREP (Preparation)
(by **thermal** hydrolysis of **pentosan**)

RN 98-01-1 HCAPLUS

CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 18 OF 30 HCAPLUS COPYRIGHT 2003 ACS

AN 1978:4714 HCAPLUS

DN 88:4714

TI Processing of nonedible plant wastes to obtain **furfural** and yeasts

AU Golowin, W. W.

CS Pol.

SO Przemysl Spozywczy (1977), 31(7), 262-4
CODEN: PRSPAD; ISSN: 0033-250X

DT Journal

LA Polish

CC 16-4 (Fermentations)

AB The technol. of **furfural** [**98-01-1**] and yeast prodn. from hydrolyzates of wastes from the food and wood-processing industries is detailed. For **furfural** manuf. the **pentosan**-contg. raw material is treated with H2SO4 and **steam**-hydrolyzed, the **furfural**-contg. **vapors** are condensed and sepd. from noncondensing **gases**, and the **furfural** is isolated from the condensate, purified, and stabilized. After the **furfural** hydrolysis, the **pressure** is decreased from 3 to 1.2 atm, a 0.5% H2SO4 soln. is added, and a hexose-contg. hydrolyzate is transferred for neutralization and yeast culturing.

ST plant waste **furfural** yeast

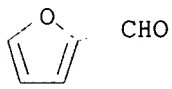
IT Yeast
(culture medium for, from plant waste)

IT Waste solids
(**furfural** and yeast prodn. from, of plants)

IT Plant
(wastes, **furfural** and yeast prodn. from)

IT Wood

(wastes, **furfural** and yeast prodn. from)
IT **98-01-1P**, preparation
RL: PREP (Preparation)
(prodn. of, from plant wastes)
IT **98-01-1P**, preparation
RL: PREP (Preparation)
(prodn. of, from plant wastes)
RN 98-01-1 HCAPLUS
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 19 OF 30 HCAPLUS COPYRIGHT 2003 ACS
AN **1977:53905** HCAPLUS
DN **86:53905**
TI Improvement of the hydrolysis process
AU Nevzorova, L. S.
CS Kanskii Biokhim. Zavod, Kansk, USSR
SO Gidroliznaya i Lesokhimicheskaya Promyshlennost (1976), (8), 19-20
CODEN: GLKPA2; ISSN: 0016-9706
DT Journal
LA Russian
CC 16-13 (Fermentations)
AB After installation of a new hydrolysis app. for high-speed digestion, a hydrolyzate with an av. concn. of 3.67% reducing substances was obtained using a raw material consisting of 57% chips, 26.9% sawdust, and 16.1% other materials. The lignin residue contained 15.7% scarcely hydrolyzable **polysaccharides**, 3.13% reducing substances, and 0.74% H2SO4. For the hydrolysis of the materials (8 m3), 30 L H2SO4 distd. from **furfural** [**98-01-1**] prodn. was added at the rate of 40 m3/h. The **pressure** in the app. was gradually increased to 7-8 kg/m2 for 20-25 min, decreased to 5 kg/cm2 during 2 min, and again increased to 8 kg/cm2. The **heating** process lasted .apprx.30 min and percolation was reduced to 80 min. The **pressure** during percolation was 11.2-11.5 kg/cm2. The washing period was increased to remove more of the reducing substances. The hydrolyzable yield per app. was increased from 15 to 80 m3 and the high rate of percolation increased the yield of reducing substances which permitted addnl. prodn. of feed yeast, alc., and **furfural**.
ST hydrolysis fermn plant waste; wood hydrlysis app
IT Wood
(degrdn. of, for fermentor medium)
IT Yeast
(feed, wood digestion for cultivation of)
IT Alcohols, preparation
RL: BMF (Bioindustrial manufacture); BIOL (Biological study); PREP (Preparation)
(manuf. of, wood digestion for fermentative)
IT **Fermentation apparatus**
(wood digestion for medium for)
IT **98-01-1P**, preparation
RL: BMF (Bioindustrial manufacture); BIOL (Biological study); PREP (Preparation)
(manuf. of, wood digestion for fermentative)
IT **98-01-1P**, preparation
RL: BMF (Bioindustrial manufacture); BIOL (Biological study); PREP (Preparation)
(manuf. of, wood digestion for fermentative)

RN 98-01-1 HCAPLUS
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)

L51 ANSWER 20 OF 30 HCAPLUS COPYRIGHT 2003 ACS
AN 1976:181811 HCAPLUS
DN 84:181811
TI Degrading a **polysaccharide**-containing raw material by acid hydrolysis
IN Kiminki, Keijo; Kulmala, Raili; Sipila, Seppo
PA Osakeyhtio W. Rosenlew AB, Finland
SO Ger. Offen., 11 pp.
CODEN: GWXXBX
DT Patent
LA German
IC C13K; D21C; C07D; C07H
CC 43-2 (Cellulose, Lignin, Paper, and Other Wood Products)
FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 2541119	A1	19760408	DE 1975-2541119	19750915
	FI 7402911	A	19760405	FI 1974-2911	19741004
	FI 51371	B	19760831		
	HU 170628	P	19770728	HU 1975-RO851	19750827
	CS 191945	P	19790731	CS 1975-6167	19750910
	NO 7503114	A	19760406	NO 1975-3114	19750912
	NO 141902	B	19800218		
	NO 141902	C	19800528		
	SE 7510297	A	19760405	SE 1975-10297	19750916
	SE 425508	B	19821004		
	SE 425508	C	19830113		
	CA 1051884	A1	19790403	CA 1975-235735	19750916
	DD 124873	C	19770316	DD 1975-188395	19750917
	US 4029515	A	19770614	US 1975-615037	19750919
	FR 2286853	A1	19760430	FR 1975-28922	19750922
	FR 2286853	B1	19790831		
	PL 97700	P	19780330	PL 1975-183667	19750930
PRAI	FI 1974-2911		19741004		

AB Two-stage continuous degrdn. of hogged birch chips or bagasse with aq. H2SO4 [7664-93-9] at high **temp**. and **pressure** gave **furfural** (I) [**98-01-1**], org. acids, and **monosaccharides**. Thus, moistening birch chips (cellulose (II) content 72% and humidity 15%) with 10% H2SO4 in the upper part of the **reactor**, and **heating** the acidified chips and the liq. phase formed from acid-decompd. chips in the lower part of the **reactor** with **steam** at 185.degree. and 11 atm for 30 min degraded 91.1% of II and gave 16.9% I, 12.2% org. acids, and 20.5% **monosaccharide** based on II content in wood.
ST wood degrdn sulfuric acid; **furfural** manuf wood degrdn; org acid wood degrdn; **monosaccharide** manuf wood degrdn
IT Carboxylic acids, preparation
RL: PREP (Preparation)
(by degrdn. of bagasse and birch wood chips with sulfuric acid)
IT Wood
(chips, degrdn. of birch, with sulfuric acid)
IT Bagasse
(degrdn. of, with sulfuric acid)

IT **Saccharides**
RL: USES (Uses)
(mono-, by degrdn. of bagasse and birch wood chips with sulfuric acid)
IT **98-01-1P**, preparation
RL: PREP (Preparation)
(by degrdn. of bagasse and birch wood chips with sulfuric acid)
IT 7664-93-9, **reactions**
RL: RCT (Reactant); RACT (Reactant or reagent)
(degrdn. with, of bagasse and birch wood chips)
IT **98-01-1P**, preparation
RL: PREP (Preparation)
(by degrdn. of bagasse and birch wood chips with sulfuric acid)
RN 98-01-1 HCAPLUS
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)

L51 ANSWER 21 OF 30 HCAPLUS COPYRIGHT 2003 ACS
AN 1976:107410 HCAPLUS
DN 84:107410
TI Control of hydrolyzers for producing **furfural** from sugar cane bagasse
IN Reis, Thomas
PA Fr.
SO Fr. Demande, 5 pp.
CODEN: FRXXBL
DT Patent
LA French
IC C07D
CC 44-2 (Industrial Carbohydrates)
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	FR 2261264	A1	19750912	FR 1974-5431	19740218
	FR 2261264	B3	19761203		
PRAI	FR 1974-5431		19740218		

AB A method is described for controlling the hydrolysis of sugar cane bagasse or all products contg. hydrolyzable **pentosans**, by adjusting the **pressure** on the **furfural** [**98-01-1**] **vapor** line to the last of a battery of hydrolyzers, using automatically controlled flow-meters on both supply and **furfural** lines.
ST sugar cane bagasse **furfural**; hydrolysis sugar cane bagasse
IT Bagasse
(**furfural** prodn. from, control of hydrolyzers in)
IT Hydrolysis
(of bagasse, in **furfural** prodn.)
IT **98-01-1P**, preparation
RL: PREP (Preparation)
(from sugar cane bagasse, control of hydrolyzers for)
IT **98-01-1P**, preparation
RL: PREP (Preparation)
(from sugar cane bagasse, control of hydrolyzers for)
RN 98-01-1 HCAPLUS
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)

CHO

L51 ANSWER 22 OF 30 HCAPLUS COPYRIGHT 2003 ACS
AN 1974:82621 HCAPLUS
DN 80:82621
TI **Furfural**
IN Morozov, E. F.
PA Kirov, S. M., Belorussian Technological Institute
SO U.S.S.R.
From: Otkrytiya, Izobret., Prom. Obraztsy, Tovarnye Znaki 1973, 50(45), 95.
CODEN: URXXAF
DT Patent
LA Russian
IC C07D
CC 27-6 (Heterocyclic Compounds (One Hetero Atom))
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
SU 405881	T	19731105	SU 1970-1404291	19700209
PRAI SU 1970-1404291		19700209		

AB **Furfural** was obtained from a **pentosan**-contg. raw material by moistening it with a soln. of acid catalyst, drying it with a **gaseous** cooling agent and treating with **superheated steam** at atm. **pressure**. The process was improved by repetition of the treatment.
ST **furfural** manuf; **pentosan** hydrolysis
IT **Pentosans**
RL: RCT (Reactant); RACT (Reactant or reagent)
(manuf. of **furfural** from)
IT **98-01-1P**, preparation
RL: PREP (Preparation)
(from **pentosans**)
IT **98-01-1P**, preparation
RL: PREP (Preparation)
(from **pentosans**)
RN 98-01-1 HCAPLUS
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)

CHO

L51 ANSWER 23 OF 30 HCAPLUS COPYRIGHT 2003 ACS
AN 1974:38552 HCAPLUS
DN 80:38552
TI Industrial testing of the direct preparation of **furfural** with the preliminary removal of atmospheric oxygen from the raw material
AU Abramyants, S. V.; Smol'yakov, V. P.; Epshtein, Ya. V.; Chudaev, V. V.; Kurzin, M. I.; Arshinov, A. N.; Ershov, B. N.; Kul'nevich, V. G.
CS USSR
SO Gidroliznaya i Lesokhimicheskaya Promyshlennost (1973), (5), 24-6
CODEN: GLKPA2; ISSN: 0016-9706
DT Journal
LA Russian

CC 43-8 (Cellulose, Lignin, Paper, and Other Wood Products)
Section cross-reference(s): 27
AB Oxygen converts **furfural** (I) [**98-01-1**] and hexoses to acids; its removal from the sunflower husks or corn stalks prior to their hydrolysis increases the yields of I and hexoses. The removal is achieved by evacuating the hydrolyzer to 0.4-0.5 kg/cm2 residual air **pressure** and blowing **steam** through it. The final O concn. in the off-**gases** is 0.5%. The concns. of I in the hydrolyzates prepd. with O removal from the sunflower husks and corn stalks are increased by 27 and 29%, resp., over the concns. of I obtained in the presence of O. Similarly, the concns. of hexoses are increased 23-4%.
ST oxygen removal **furfural** manuf; hydrolysis **polysaccharide** oxygen **furfural**
IT Sunflower
(husks, air removal from, **furfural** and hexoses prepn. in relation to)
IT Hexoses
RL: PREP (Preparation)
(prepn. of, by hydrolysis of cellulosic materials, air removal effect on)
IT Air
(removal of, from cellulosic materials, **furfural** and hexoses prepn. in relation to)
IT Corn
(stalks, air removal from, **furfural** and hexoses prepn. in relation to)
IT **98-01-1P**, preparation
RL: PREP (Preparation)
(by hydrolysis of cellulosic materials, air removal effect on)
IT **98-01-1P**, preparation
RL: PREP (Preparation)
(by hydrolysis of cellulosic materials, air removal effect on)
RN 98-01-1 HCAPLUS
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)

L51 ANSWER 24 OF 30 HCAPLUS COPYRIGHT 2003 ACS
AN 1973:126041 HCAPLUS
DN 78:126041
TI Principle of the catalytic activity of cations during **furfural** formation
AU Vedernikov, N. A.; Kalnins, A.
CS Inst. Khim. Drev., Riga, USSR
SO Khimiya Drevesiny (1968-74) (1972), 11, 111-14
CODEN: KHDRAN; ISSN: 0453-8226
DT Journal
LA Russian
CC 43-8 (Cellulose, Lignin, Paper, and Other Wood Products)
AB The rate const. (K) of **furfural** (I) [**98-01-1**] formation during **heating** wood in **superheated steam** at 137.deg. and 3.0 kg/cm2 **pressure** is related to the ionization potentials (I) of the catalyst cation: K = a0 + a1I + a2I2 + a3I3, where a0-a3 are consts. This relation is obeyed when NaCl, HCl, CaCl2, ZnCl2, AlCl3, or CrCl3 solns. are used to impregnate wood before its degradation to I. The relation is not obeyed when FeCl3 is the catalyst, because of the redox processes superimposed on the

cation-catalyzed I formation. The catalyst anions do not participate in the catalysis. The catalysis may involve the formation of ionic intermediates between the hydrated catalyst cations and wood **pentosans.**

ST catalysis **furfural** formation wood

IT Wood
(**heating** of, with **steam, furfural** formation in)

IT Catalysts and Catalysis
(methyl chloride, for formation of **furfural,** in **steam -heated** wood)

IT **Steam**
(wood **heating** with, **furfural** formation by)

IT 7446-70-0, uses and miscellaneous 7646-85-7, uses and miscellaneous 7647-01-0, uses and miscellaneous 7647-14-5, uses and miscellaneous 10025-73-7 10043-52-4, uses and miscellaneous
RL: CAT (Catalyst use); USES (Uses)
(catalysts, for formation of **furfural,** in **steam-heated** wood)

IT **98-01-1P,** preparation
RL: FORM (Formation, nonpreparative); PREP (Preparation)
(formation of, by **heating** of wood with **steam**)

IT **98-01-1P,** preparation
RL: FORM (Formation, nonpreparative); PREP (Preparation)
(formation of, by **heating** of wood with **steam**)

RN 98-01-1 HCAPLUS

CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)

L51 ANSWER 25 OF 30 HCAPLUS COPYRIGHT 2003 ACS

AN 1970:467834 HCAPLUS

DN 73:67834

TI **Furfural** from corncobs pretreated with low-frequency sound

AU Dolgopolov, I. P.; Goryaev, M. I.; Pugachev, M. G.

CS Inst. Khim. Nauk, Alma-Ata, USSR

SO Gidroliznaya i Lesokhimicheskaya Promyshlennost (1970), 23(4), 16-17
CODEN: GLKPA2; ISSN: 0016-9706

DT Journal

LA Russian

CC 43 (Cellulose, Lignin, Paper, and Other Wood Products)

AB Hydrolysis of corncob **pentosans** and dehydration of the **pentoses** was carried out in a **preheated** autoclave, using nontreated raw material and material pretreated with sound at a frequency of 100 Hz. The raw material wetted with H2SO4 of varying concns. and contg. NaCl was pretreated for 90 min at room **temp.** The **furfural vapor** was blown off at 4-10 kg/cm2. The residual lignocellulose was hydrolyzed with 3% H2SO4. The highest yield of **furfural** was obtained at a 6% acid concn. and blow-off **pressure** 6 kg/cm2. The max. yield was 10.52% and 7.48% from the pretreated and untreated corncobs. **Furfural** concn. in the condensate was increased from 3.84 to 5.10%; the yield of sugars from lignocellulose of pretreated corncobs was reduced (from 8-10% to 6-8%).

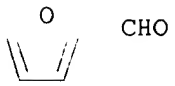
ST furufural corncobs; corncobs **furfural;** hydrolysis corncobs; sound pretreatment corncobs hydrolysis

IT Sound, chemical and physical effects
(corncobs pretreated with, **furaldehyde** from, by hydrolysis)

IT Corncobs

(sound-pretreated, **furaldehyde** from, by hydrolysis)
IT **98-01-1P**, preparation
RL: PREP (Preparation)
(from sound-pretreated corncob, by hydrolysis)
IT **98-01-1P**, preparation
RL: PREP (Preparation)
(from sound-pretreated corncob, by hydrolysis)
RN 98-01-1 HCAPLUS
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)

L51 ANSWER 26 OF 30 HCAPLUS COPYRIGHT 2003 ACS
AN 1969:88986 HCAPLUS
DN 70:88986
TI Experimental apparatus for the continuous preparation of **furfural** from **pentosan** hydrolyzates. I
AU Smolyakov, V. P.; Kul'nevich, V. G.; Mukhin, B. P.
CS Krasnodar. Politekh. Inst., Krasnodar, USSR
SO Gidroliznaya i Lesokhimicheskaya Promyshlennost (1969), 22(1), 11-13
CODEN: GLKPA2; ISSN: 0016-9706
DT Journal
LA Russian
CC 43 (Cellulose, Lignin, Paper, and Other Wood Products)
AB Earlier lab. expts. showed that multistage high-**temp**. dehydration of hydrolyzates can be carried out in continuously operating industrial equipment. See ibid. 1967. Exptl. equipment of industrial size has been constructed and subjected to a series of runs that confirmed the correctness of the high-**temp**. dehydration principles. The exptl. equipment differs from the lab. app. in the no. of dehydration stages. It is equipped with 6 serially connected **reactors**. The operating conditions can be varied so that 3, 4, 5, or all 6 **reactors** work. The **pentosan** hydrolyzate passes first through a **heat** exchanger where its **temp**. is raised to 50-100.degree., then goes to the **steam** ejector where the **steam** is introduced under a **pressure** of 30 atm. and at a **temp**. of 230-32.degree.. Dehydration, which begins in the ejector, continues in the consecutive **reactors** and in the pipes connecting them. The **steam/furfural** mixt. is continuously withdrawn into a condenser, and then into a receiving tank. Trial runs of the equipment were conducted with 3-6 **reactors** operating (schemes A, B, C, and D), the material dehydrated being **pentosan** hydrolyzates contg. 5-6% reducing substances, 0.5-0.6% hexoses, and 4.5-5% **pentoses**. Exptl. data obtained in these runs are given and the results obtained are discussed.
ST **furfural** prepn **pentosans**; **pentosans** **furfural** prepn; hydrolysis **pentosans** **furfural**
IT **Pentosans**
RL: USES (Uses)
(**furaldehyde** from hydrolyzates of app. for)
IT **98-01-1P**, preparation
RL: PREP (Preparation)
(from **pentosan** hydrolyzates, app. for)
IT **98-01-1P**, preparation
RL: PREP (Preparation)
(from **pentosan** hydrolyzates, app. for)
RN 98-01-1 HCAPLUS
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 27 OF 30 HCAPLUS COPYRIGHT 2003 ACS
AN 1968:62511 HCAPLUS
DN 68:62511
TI Process and apparatus for the physical and chemical transformation of agricultural and biological wastes
IN Pillorget, Pierre
PA Societe des Produits Chimiques de Sainte-Colombe
SO Fr., 6 pp.
CODEN: FRXXAK
DT Patent
LA French
IC C05F
CC 60 (Sewage and Wastes)
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
FR 1484673		19670616	FR	19660301

AB The wastes were hydrolyzed with acidulated water to transform the **pentosans** to **furfural** (I) and a part of the celluloses (II) into sugars. The extn. of I is limited to prevent the carbonization of II and of lignin, and the destruction of sugars. The crushed materials to be treated were sent by an elevator to a funnel where they were humidified until satn. after which they went into the hydrolyzer under 2 or 3 atm. of **vapor**; the dropping at the base of the app. permitted the recycling of excess acidulated water to the funnel. A system of sluices permitted, when the balance of **pressures** was obtained in the top of the app., to send I-contg. **vapors** through filters where the furan **gas** and then I-contg. **vapors** were condensed with a refrigerant, to be later on sent to a distn. unit. When the I content was .apprx.1%, hydrolysis was stopped, the hydrolyzate drawn off, the app. charged, and a new cycle begun. The neutralized hydrolyzate was stored and its sugars (nonsterilized) slowly transformed the matter into a moist compost contg. org. matter, N, sol. or insol. **phosphoric acid**, humic acids, and potash. This compost can be dried and sown with Azobacter.
ST COMPOSTS AGRICULTURAL WASTES; SUGARS AGRICULTURAL WASTES; BIOL WASTES TRANSFORMATION; AGRICULTURAL WASTES TRANSFORMATION
IT Wastes
(hydrolysis and composting of)
IT Compost
(manuf. of)
IT Hydrolysis
(of wastes)
IT **98-01-1P**, preparation
RL: IMF (Industrial manufacture); PREP (Preparation)
(manuf. of, by hydrolysis of wastes)
IT **98-01-1P**, preparation
RL: IMF (Industrial manufacture); PREP (Preparation)
(manuf. of, by hydrolysis of wastes)
RN 98-01-1 HCAPLUS
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)

L51 ANSWER 28 OF 30 HCAPLUS COPYRIGHT 2003 ACS
AN 1968:22886 HCAPLUS
DN 68:22886
TI Recovery of **furfural** from **pentosan**-containing materials
IN Kaila, Anjal A.
PA Heinolan Faneritehdas Zachariassen ja Co.
SO Finn., 5 pp.
CODEN: FIXXAP
DT Patent
LA Finnish
IC C07D
CC 43 (Cellulose, Lignin, Paper, and Other Wood Products)
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
FI 36437		19670915	FI	19571231

AB A method and app. are described for recovery of **furfural** (I) during **heat** and **pressure** treatment of **pentosancontg**. materials for fiberboard and semichem. pulp manuf. Favorable conditions for I formation were achieved by application of inorg. or org. acids or their salts with **steam** on chips in an impregnation chamber, feeding the treated chips by a screw to a **reaction** vessel, and controlling the retention time and **temp**. to maintain the pH between 2.5 and 3.0 before releasing the material through another screw to a **pressure** refiner. A portion of the I was recovered from the **vapors** withdrawn from the lower section of the digestion to a distn. column and the rest from the **vapors** sepd. from the refined fiber mass in a cyclone and fed to the same distn. column.
ST **FURFURAL** RECOVERY **PENTOSAN**; FIBERBOARD **FURFURAL** RECOVERY; SEMICHEM PULP **FURFURAL** RECOVERY; **PENTOSAN** MATERIALS **FURFURAL**
IT Paper pulp
(2-**furaldehyde** recovery in manuf. of semichem., app. for)
IT Fiberboard
(2-**furaldehyde** recovery in manuf. of, app. for)
IT **98-01-1P**, preparation
RL: PREP (Preparation)
(recovery of, in fiberboard and semichem. paper pulp manuf., app. for)
IT **98-01-1P**, preparation
RL: PREP (Preparation)
(recovery of, in fiberboard and semichem. paper pulp manuf., app. for)
RN 98-01-1 HCAPLUS
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)

L51 ANSWER 29 OF 30 HCAPLUS COPYRIGHT 2003 ACS
AN 1967:516764 HCAPLUS
DN 67:116764

TI Continuous production of **furfural** during hightemperature **pentose** dehydration
AU Kul'nevich, V. G.; Smolyakov, V. P.; Maksimenko, N. S.; Fal'kovich, Yu. E.
SO Gidroliznaya i Lesokhimicheskaya Promyshlennost (1967), 20(4), 14-15
CODEN: GLKPA2; ISSN: 0016-9706
DT Journal
LA Russian
CC 27 (Heterocyclic Compounds (One Hetero Atom))
AB In the known processes for the continuous production of **furfural**, the **reaction** is carried out at .ltoreq.200.degree., for .gtoreq.35 min., and the yield of **furfural** does not exceed 40-45% of the total content of **pentoses** in the hydrolyzate. The tacky resinous products formed from the degradation of **furfural** clog the equipment and conduits. The continuous process described in U.S.S.R. 179,331 (CA 65: 2473d), is based on the fact that at >200.degree. the rate of dehydration of **pentoses** increases more rapidly with **temp**. than the rate of **furfural** degradation. For best results, the hydrolyzate must be **heated** instantaneously to 230-50.degree., the hydrolyzate maintained at this **temp**. only for the time necessary for the dehydration of **pentoses**, and the **furfural** withdrawn from the **reaction** zone as soon as it is formed. NaCl is added to the hydrolyzate to convert resinous substances (the formation of a certain amt. of these substances cannot be avoided) into non-tacky product. **Heating** is achieved by injection of **steam**, and the **furfural vapors** are continuously withdrawn from the **reaction** zone. Several models of equipment were constructed, and one, shown to perform the best, is described. It comprises an injection vessel, two **reactors**, an **evaporator**, condenser, and condensate receivers. As detd. by a series of trial runs, the optimum conditions of the process are: content of sugars, H_2SO_4, and NaCl in the hydrolyzate 4.84, 0.5, and 1%, resp., a hydrolyzate feeding rate 0.17 l./min., **steam pressure** in the **boiler**, the 1st **reactor**, and the 2nd **reactor** 32-36, 28-20, and 10-15 atm., resp., **temp**. in the first **reactor** 230.degree., residence time in the first **reactor** 2.7-2.8 min. Under these conditions, 87-93% of the reducing substances are degraded, and the yield of **furfural** is 62-69.5%, based on total **pentoses**.
ST **FURFURAL PENTOSE** DEHYDRATION; **PENTOSE** DEHYDRATION **FURFURAL**
IT **98-01-1P**, preparation
RL: PREP (Preparation)
(manuf. of, by **pentosan** hydrolyzate **steam** treatment under **pressure**)
IT **98-01-1P**, preparation
RL: PREP (Preparation)
(manuf. of, by **pentosan** hydrolyzate **steam** treatment under **pressure**)
RN 98-01-1 HCAPLUS
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)

L51 ANSWER 30 OF 30 HCAPLUS COPYRIGHT 2003 ACS
AN 1967:501196 HCAPLUS
DN 67:101196
TI Formation of **furfural** from **pentosan**-containing raw materials under atmospheric **pressure** in the presence of sulfuric

acid
AU Mel'nikov, N. P.; Zheltukhina, V. A.
SO Sb. Tr., Gos. Nauch.-Issled. Inst. Gidroliz. Sul'fitno-Spirt. Prom. (1966), 15, 108-20
DT Journal
LA Russian
CC 43 (Cellulose, Lignin, Paper, and Other Wood Products)
AB Because of the necessity for recovering H_2SO_4, methods of production of **furfural** from plant materials involving the use of relatively large amts. of the acid (3-5:1 ratios) of high concns. (up to 50%), were found to be unsuitable for industrial applications. Methods involving higher **pressures** and **temps**. and 1-3% acid consumption based on the rawmaterial wt. were more economical and have been used in the industry. The process developed by the authors is based on the method described by Chetverikov and Lazarev (CA 28: 30719), which consists of impregnating the raw material with 3-4% acid, then treating with **superheated steam** (or hot **gas**) under atm. **pressure**, to conc. the soln. of the catalyst. A study of the kinetics of **furfural** formation from pure xylose solns. showed that the rate of the **reaction** increases considerably when the acid concn. reaches 20-5%. At .gtoreq.40%, and accordingly higher b.p., 50% xylose is converted to **furfural** within 30-40 min. To attain such a concn., .apprx.0.5 kg. H_2O must be evapd./kg. ovendry raw material, an operation difficult to carry out under com. conditions. The suggested process solves this problem by impregnating the raw material with a small amt. of more concd. acid. In lab. and pilot-plant expts., the concns. of H_2SO_4 were 10-45%, the acid raw material ratios ranged from 0.3 to 0.05:1, and the **steam temp**. was 180-250.degree.. Sunflower husks and milled birchwood were the raw materials and the time of **furfural** distn. ranged from 120 to 180 min. In the lab., the max. **furfural** yield of 5.7-5.9% (on ovendry material) was obtained from sunflower husks at an acid concn. of 30% and a ratio of 0.27:1, and the max. yield of 6.85% from birchwood at 10% concn. and a 0.25:1 ratio. Under pilot-plant conditions, birchwood yielded a max. amt. of **furfural** (7.6%) at 40% and a 0.05:1 ratio.
ST **PENTOSAN** MATERIALS **FURFURAL** PRODN; **FURFURAL** FROM **PENTOSAN** MATERIALS; XYLOSE **FURFURAL** FORMATION; SUNFLOWER HUSKS **FURFURAL**; BIRCHWOOD **FURFURAL** PRODN
IT Wood
(2-**furaldehyde** from birch, in presence of sulfuric acid)
IT Sunflower
(2-**furaldehyde** from husks, in presence of sulfuric acid)
IT Kinetics, **reaction**
(of formation of 2-**furaldehyde** from xylose in presence of sulfuric acid)
IT Catalysts
(sulfuric acid as, for prepn. of 2-**furaldehyde** from birchwood and sunflower husks or xylose)
IT 7664-93-9, uses and miscellaneous
RL: CAT (Catalyst use); USES (Uses)
(catalysts, for prepn. of 2-**furaldehyde** from birchwood and sunflower husks or xylose)
IT **98-01-1P**, preparation
RL: PREP (Preparation)
(from sunflower husks and birchwood or xylose, in presence of sulfuric acid, kinetics of)
IT **98-01-1P**, preparation
RL: PREP (Preparation)
(from sunflower husks and birchwood or xylose, in presence of sulfuric acid, kinetics of)
RN 98-01-1 HCAPLUS
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)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L80  ANSWER 1 OF 18  WPIX (C) 2003 THOMSON DERWENT
AN   2003-003444 [01]   WPIX
DNC  C2003-001457
TI   Liquid phase conversion of cellulose for pharmaceuticals, comprises
     heating cellulose containing substances in presence of acid or
     base.
DC   D17 E19 F09
PA   (KAGA-N) KAGAKU GIJUTSU SHINKO JIGYODAN
CYC  1
PI   JP 2002205970 A  20020723 (200301)*       4p    C07C045-60
ADT  JP 2002205970 A JP 2001-66 20010104
PRAI JP 2001-66       20010104
IC   ICM  C07C045-60
     ICS  C07C047-12; C07C047-127; C07D307-50; C07D493-04
ICA  C07B061-00
AB   JP2002205970 A UPAB: 20030101
     NOVELTY - Liquid phase contact conversion of cellulose comprises
     heating the cellulose containing substance in aprotic polar
     solvent in presence of acid or base, and transforming cellulose into
```

soluble substance.

USE - For converting the cellulose contained in natural fibers such as cotton to soluble substance such as levoglucosenone for pharmaceuticals as synthetic synthone, and **furfural** which is used as resin raw material.

ADVANTAGE - The cellulose is converted efficiently and selectively into useful chemical product by simple method.

Dwg.0/0

FS CPI

FA AB; DCN

MC CPI: D06-H; E06-A02E; **E07-A01**; E10-D01C; E10-F02B; F05-A02A

TECH UPTX: 20030101

TECHNOLOGY FOCUS - ORGANIC CHEMISTRY - Preferred Process: The cellulose containing substance is **heated** at a **temperature** of less than the **boiling** point of aprotic polar solvent in the presence of inorganic acid or base, and the cellulose is transformed into low molecular carbonyl compounds.

ABEX

SPECIFIC COMPOUNDS - The carbonyl compound is levoglucosenone and/or furfural if the conversion is in presence of acid, glyoxal and/or 2,3-butane dione if the conversion is in presence of base.

EXAMPLE - Sulfolane (2 ml) containing cellulose (20 mg) dispersed in nitrogen atmosphere was thermally decomposed at 200-280degreesC in presence of polyphosphoric acid and sulfuric acid. The cellulose was completely solubilized in a shorter duration and a brown solution was obtained. Levoglucosenone with a yield of 19.8 mol% was obtained when 1% polyphosphoric acid was used, and furfural with a yield of 17.5 mol% was obtained when 1% sulfuric acid was used.

L80 ANSWER 2 OF 18 WPIX (C) 2003 THOMSON DERWENT

AN 2002-292407 [33] WPIX

DNC C2002-085952

TI **Gaseous** acid catalysis method, particularly for production of **furfural**, involves treating a solid reactant containing hydroxyl group(s) with **superheated steam** and introducing an acid catalyst e.g. hydrochloric acid.

DC E13

IN **ZEITSCH, K; ZEITSCH, K J**

PA (ZEIT-I) ZEITSCH K; (BUZZ-I) BUZZARD J L; (STEI-I) STEINER P D

CYC 88

PI WO 2002022593 A1 20020321 (200233)* EN 14p C07D307-50 <--
RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TR TZ UG ZW
W: AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT UA UG US UZ VN YU ZA ZW
DE 10045465 A1 20020328 (200233) C07D307-50 <--
AU 2002024485 A 20020326 (200251) C07D307-50 <--

ADT WO 2002022593 A1 WO 2001-ZA146 20010914; DE 10045465 A1 DE 2000-10045465 20000914; AU 2002024485 A AU 2002-24485 20010914

FDT AU 2002024485 A Based on WO 200222593

PRAI DE 2000-10045465 20000914

IC ICM **C07D307-50**

AB WO 200222593 A UPAB: 20020524

NOVELTY - A method of **gaseous** acid catalysis comprises:

(a) introducing a solid reactant containing hydroxyl group(s) into a **reactor**;

(b) introducing **superheated steam** until the reactant is dry and the **temperature** is above the dew point of both water and the catalyst to be used;

(c) introducing the acid together with the **superheated**

steam by means of a **vaporizer**; and
(d) condensing the formed **gas**.
USE - The method is particularly useful for forming **furfural** (claimed) from **pentosan** and/or pentose in the form of e.g. sunflower stems, corn cobs and/or bagasse.
ADVANTAGE - At any chosen **temperature**, the process can be carried out at atmospheric **pressure**. As the water/HCl catalyst is used at above its dew point, there is no corrosion and mild steel **reactors** can be used. The acid part of the catalyst can be completely recovered and reused. The residue is dry and free of acid so that it can be burnt, or partially burnt to give 'producer **gas**'. The yield of **furfural** is close to 100% compared with only 50% for present industrial processes.
Dwg.0/2

FS CPI
FA AB; DCN
MC CPI: **E07-A01**; E07-H; E10-D01C; E31-B03D; N04-D
TECH UPTX: 20020524
TECHNOLOGY FOCUS - ORGANIC CHEMISTRY - Preferred Method: The reactant can form an ionized cluster complex with water and (part of) the acid. Reaction is carried out at atmospheric **pressure**. The acid is hydrochloric. Reaction is carried out at a **temperature** above the b. pt. of the maximum HCl-H2O azeotrope. The reactant is a sugar and the product is an aldehyde.
Preferred Reaction: **Furfural** is manufactured by hydrolysis of **pentosan** and/or pentose, and subsequent dehydration, in the presence of **gaseous** HCl. Reaction is performed at 115 deg. C and may be continuous. The HCl is recycled as its azeotrope with water. The yield of **furfural** is more than 90%.
ABEX
EXAMPLE - None given.

L80 ANSWER 3 OF 18 WPIX (C) 2003 THOMSON DERWENT
AN 2000-680440 [67] WPIX
DNC C2000-207127
TI Production of **furfural** from sulfite waste liquor involves heating by direct injection of steam, reaction by boiling under pressure, using easily separated ancillary, and complete vaporization by cooling and depressurization.
DC E13 F09
IN **ZEITSCH, K; ZEITSCH, K J**
PA (STEI-I) STEINER P D; (ZEIT-I) ZEITSCH K; (ITFU-N) INT FURAN TECHNOLOGY PTY LTD
CYC 93
PI DE 19917178 A1 20001019 (200067)* 4p C07D307-48
WO 2000063488 A1 20001026 (200067) EN D21C011-00
RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW NL OA PT SD SE SL SZ TZ UG ZW
W: AE AG AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW
AU 2000054999 A 20001102 (200107) D21C011-00
EP 1171665 A1 20020116 (200207) EN D21C011-00
R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI
BR 2000009815 A 20020108 (200208) D21C011-00
NO 2001005031 A 20011211 (200211) D21C000-00
ZA 2001008552 A 20021127 (200305) 23p D21C000-00
ADT DE 19917178 A1 DE 1999-19917178 19990416; WO 2000063488 A1 WO 2000-ZA72 20000414; AU 2000054999 A AU 2000-54999 20000414; EP 1171665 A1 EP 2000-940001 20000414, WO 2000-ZA72 20000414; BR 2000009815 A BR 2000-9815 20000414, WO 2000-ZA72 20000414; NO 2001005031 A WO 2000-ZA72 20000414, NO

2001-5031 20011016; ZA 2001008552 A ZA 2001-8552 20011018
FDT AU 2000054999 A Based on WO 200063488; EP 1171665 A1 Based on WO 200063488; BR 2000009815 A Based on WO 200063488
PRAI DE 1999-19917178 19990416
IC ICM C07D307-48; D21C000-00; D21C011-00
ICS **C07D307-50**
AB DE 19917178 A UPAB: 20001223
NOVELTY - Production of **furfural** from sulfite waste liquor involves heating by injecting steam; passing it to a pressure reaction column, where the pressure is reduced slightly; keeping it boiling for a long time by easily separated ancillary; and then discharge and cooling, with total depressurization.
USE - None given.
ADVANTAGE - As sulfite waste liquor contains 0.9-5.6 % pentose, it is a potential raw material for **furfural** manufacture, especially at high pentose contents. Waste liquor from the calcium sulfite process is saturated with calcium sulfate, which soon builds up heavy deposits in heat exchangers and makes continuous operation impossible. On the other hand, the liquor cannot be kept at the boiling point for the reaction time by direct injection of steam. Heating by direct injection of steam and using an ancillary to maintain boiling overcomes this problem.
DESCRIPTION OF DRAWING(S) - The drawing shows the process scheme.
Pump 1
Circulation mixer 2
Valve 3
Thermally insulated reaction column 4
Cyclone for cooling and total depressurization, with steam generation 5
Heat exchanger for electrical heating of compressed air 6
Control cycle 7, 8
Condenser 9
Absorption column operating at atmospheric pressure 10
Circulating pump 11
Receiver for mixture of **furfural** and water liquefied in condenser 12
Dwg.1/1
FS CPI
FA AB; GI; DCN
MC CPI: E07-A01; E11-Q01; F05-A02C
TECH UPTX: 20001223
TECHNOLOGY FOCUS - ORGANIC CHEMISTRY - Preferred Process: The liquor is heated to 180-280, preferably 240, degreesC by injecting steam. Partial depressurization in the reactor is carried out to 170-270, preferably 234, degreesC. The ancillary is heated compressed air, hot combustion gas, a single gas or preferably gas mixture at high temperature or hot liquid mercury. The temperature of the hot gas is 400-2000, preferably 600-1000 degreesC.
ABEX
SPECIFIC MATERIALS - A specific example of the ancillary is hot liquid mercury.

L80 ANSWER 4 OF 18 WPIX (C) 2003 THOMSON DERWENT
AN 2000-544604 [50] WPIX
DNC C2000-162247
TI **Furfural** production by **heating** acidified raw material containing **pentosan** uses condensation of **steam** for **heating** and delayed flash **evaporator** by steady, small leakage stream to maintain **boiling**.
DC E13
IN **ZEITSCH, K; ZEITSCH, K J**
PA (STEI-I) STEINER P D; (ZEIT-I) ZEITSCH K; (ITFU-N) INT FURAN TECHNOLOGY PTY LTD
CYC 88

PI DE 19905655 A1 20000817 (200050)* 5p C07D307-50 <--
WO 2000047569 A1 20000817 (200050) EN C07D307-50 <--
RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW NL OA PT SD SE SL SZ TZ UG ZW
W: AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT UA UG US UZ VN YU ZA ZW
AU 2000033991 A 20000829 (200062) C07D307-50 <--
EP 1161426 A1 20011212 (200204) EN C07D307-50 <--
R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI
BR 2000008143 A 20020312 (200226) C07D307-50 <--
ZA 2001006721 A 20021127 (200305) 19p C07D000-00

ADT DE 19905655 A1 **DE 1999-19905655 19990211**; WO 2000047569 A1 **WO 2000-ZA24 20000211**; AU 2000033991 A AU 2000-33991 20000211; EP 1161426 A1 EP 2000-912231 20000211, **WO 2000-ZA24 20000211**; BR 2000008143 A BR 2000-8143 20000211, **WO 2000-ZA24 20000211**; ZA 2001006721 A ZA 2001-6721 20010815

FDT AU 2000033991 A Based on WO 200047569; EP 1161426 A1 Based on WO 200047569; BR 2000008143 A Based on WO 200047569

PRAI **DE 1999-19905655 19990211**

IC ICM C07D000-00; **C07D307-50**

AB DE 19905655 A UPAB: 20001010
NOVELTY - Production of **furfural** comprises acidifying a raw material containing **pentosan** with aqueous sulfuric acid, **heating** in a batch **reactor** by condensation of feed stream of **steam** at a **temperature** T1 and then delayed flash **evaporation** to keep the liquid phase **boiling** continuously by maintaining a steady, small leakage stream, until a **temperature** T2 is reached.
USE - None given.
ADVANTAGE - In existing industrial processes, which use plant originally constructed for a cereal treatment operation or for making pulp from wood, the yield does not exceed 60 %, largely as the result of reaction of **furfural** with xylose. The present process is very simple and gives about 100 % yield.
DESCRIPTION OF DRAWING(S) - The drawing shows the process scheme.
Reactor filled with acidified raw material 1
Valve admitting **steam** 2
Leakage **valve** 3
Valve opened to terminate reaction 4
Control equipment 5
Dwg.2/2

FS CPI

FA AB; GI; DCN

MC CPI: **E07-A01**

TECH UPTX: 20001010
TECHNOLOGY FOCUS - CHEMICAL ENGINEERING - Preferred Process: **Heat**-up and delayed flash **evaporation** are repeated once or more, until **furfural** no longer forms. Delayed flash **evaporation** is carried out at 280-150, preferably 230-170 degreesC. The **reactor** has good thermal insulation and can have **heated** walls. All the required **valve** operations are carried out automatically with a controller. The **temperature** range of delayed flash **evaporation** and acid concentration of the charge are coupled for optimum development of the process.

L80 ANSWER 5 OF 18 WPIX (C) 2003 THOMSON DERWENT

AN 1993-258728 [32] WPIX

CR 1992-299959 [36]

DNC C1993-114971

TI Pulping fibrous plant materials - to afford novel low mol. wt. lignin,

with recycle of solvents and filtrates etc..

DC A60 E13 F09

IN AGAR, R C; CRONLUND, M; GOPAL, G C; KATZEN, R; LEBLANC, R; LORA, J H; RASKIN, M N; WINNER, S R; WU, C F; LE, BLANC R; LE-BLANC, R

PA (REPA-N) REPAP TECHNOLOGIES INC

CYC 30

PI WO 9315261 A1 19930805 (199332)* EN 62p D21C007-00
RW: AT BE CH DE DK ES FR GB GR IE IT LU MC NL PT SE
W: AU BR CA CZ FI HU JP KR NO NZ PL PT RU UA
AU 9336649 A 19930901 (199350) D21C007-00
NO 9402824 A 19940928 (199444) D21C007-00
FI 9403541 A 19940919 (199445) D21C000-00
JP 08500854 W 19960130 (199642) 51p D21C011-00
EP 746650 A1 19961211 (199703) EN D21C007-00
R: AT CH DE DK ES FR GB IT LI NL SE
BR 9305819 A 19970218 (199714) D21C007-00
AU 9712397 A 19970313 (199719) D21C009-02
AU 9712398 A 19970320 (199720) D21C003-20
AU 676829 B 19970327 (199721) D21C003-20

ADT WO 9315261 A1 WO 1993-US1256 19930129; AU 9336649 A AU 1993-36649 19930129; NO 9402824 A WO 1993-US1256 19930129, NO 1994-2824 19940729; FI 9403541 A WO 1993-US1256 19930129, FI 1994-3541 19940728; JP 08500854 W JP 1993-513540 19930129, WO 1993-US1256 19930129; EP 746650 A1 EP 1993-905902 19930129, WO 1993-US1256 19930129; BR 9305819 A BR 1993-5819 19930129, WO 1993-US1256 19930129; AU 9712397 A Div ex AU 1993-36649 19930129, AU 1997-12397 19970130; AU 9712398 A Div ex AU 1993-36649 19930129, AU 1997-12398 19970130; AU 676829 B AU 1993-36649 19930129

FDT AU 9336649 A Based on WO 9315261; JP 08500854 W Based on WO 9315261; EP 746650 A1 Based on WO 9315261; BR 9305819 A Based on WO 9315261; AU 676829 B Previous Publ. AU 9336649, Based on WO 9315261

PRAI WO 1992-US720 19920129

REP US 3585104; US 4100016; US 4401514; US 4470876; US 4511433; US 4584057; US 4764596; US 4971657

IC ICM D21C000-00; D21C003-20; D21C007-00; D21C009-02; D21C011-00
ICS D21C009-08; D21C009-10; D21C009-153

AB WO 9315261 A UPAB: 19931122
(A) Fibrous plant material (I) is pulped in an H2O-miscible organic solvent (II), and the solvent (II), lignin (III) and other by-prods. are recovered as follows: (a) the wetted (I) is **heated**; (b) the mixt. is impregnated with the solvent (II); (c) the impregnated (I) mixt. is extracted with (II) to afford a cooking mixt. which comprises black liq. (comprising (III) and the by-prods.) and cellulose pulp; and (d) (III) is recovered from the black liq.

(B) A low mol. wt. (III) of no. average mol. wt. less than 500 g/mol., and glass transtion **temp**. 24-60 deg.C is new.

USE/ADVANTAGE - The process provides an energy efficient, environmentally attractive and economically feasible means of pulping fibrous plant materials, and recovering of the by-prods., with recycle of solvents and bleaching filtrates etc. **Furfural** is recovered, and this is used to recover the low mol. wt. lignin. The low mol. wt. lignin (B) may be used as an extender in phenolic wood adhesive systems, and also in applicns. requiring H2O-solubility (e.g. fibreglass binders), and as an intermediate for the prodn. of syringaldehyde etc. The process also affords a very pure lignin of no. average mol. wt. 700-1500 g/mol. as a fine uniform, free-flowing powder, which is suitable for use as a PhOH/HCHO extender in the prepn. of particle board and plywood, and in the prepn. of moulding cpds., urethane and epoxy resins, antioxidants, controlled release agents, and flow control agents.

Dwg.0/12

FS CPI

FA AB; DCN

MC CPI: A03-C02; A10-A; A11-C03; **E07-A01**; E11-Q01; F05-A02B; F05-A02C

L80 ANSWER 6 OF 18 WPIX (C) 2003 THOMSON DERWENT
AN **1993-141601** [17] WPIX
DNC **C1993-063648**
TI Prodn. of **furfurol** for mfr of plastics - by hydrolysis of pentose-contg. material using hydrolysing mixt. contg. sulphuric acid, mercapto-benzimidazole, surfactant and water.
DC A41 E13
IN AIKHODZHAEV, B I; BERENSHTEIN, E I; YUSUPKHANOVA, M M
PA (COTT-R) COTTON CELLULOSE CHEM TECHN INST
CYC 1
PI SU 1731774 A1 19920507 (199317)* 4p C07D307-50 <--
ADT SU 1731774 A1 SU 1990-4781275 19900110
PRAI SU 1990-4781275 19900110
IC ICM **C07D307-50**
AB SU 1731774 A UPAB: 19931116
The method comprises hydrolysis of a pentose-contg. material by treating it with a soln. of hydrolysing mixt. contg. sulphuric acid. The hydrolysing mixt. contains (in wt.%): sulphric acid 2-10, mercapto benzimidazole 0.5-2.0, surfactant OP-7 0.25-1.0 and balance water. Mercaptobenzimidazole is contained in the hydrolysing soln. in the form of a suspension, and is uniformly distributed on the surface of starting vegetable material. The presence of mercapto-benzimidazole has delaying effect on decomposition rate of **furfurol**. OP-7 is used as an non-ionic surfactant.

After soaking of the pentose-contg. material, e.g. dried cotton or corn waste, in the hydrolysing soln., the pulp is transferred to hydrolysing appts. **heated** for 30 min. under **pressure** 1 atmos. with removal of air and non-condensed **gases**. The **pressure** is raised to 6 atmos. and the **heating** is continued for 1.5 hrs. **Furfurol** is removed using **preheated steam**, and is collected in the form of condensate.

Tests show that the proposed method increases the yield of **furfurol** from cotton waste to 62% and from corn husks to 60%, i.e. by 21.4-27.3% compared to yield obtd. using the known method.

USE/ADVANTAGE - In the prodn. of **furfurol** by hydrolysis of a pentose-contg. vegetable material. The method increases yield of **furfurol** used in the prodn. of plastics. Bul.17/7.5.92
Dwg.0/0
FS CPI
FA AB; DCN
MC CPI: A01-E10; A01-E14; E07-A02D

L80 ANSWER 7 OF 18 WPIX (C) 2003 THOMSON DERWENT
AN 1991-250658 [34] WPIX
DNC C1991-109121
TI Extn. of biologically active material from raw vegetable material - by treatment with pentose hydrolysate, vacuum concn. of extract, **heat** treatment, and sepn. of clarified portion of concentrate.
DC B03 C02 D16 D17 E13
IN KLIMOVA, Z K; KRYMSKII, M V
PA (ALBU-R) ALBUMINE-SYNTH RES
CYC 1
PI SU 1595907 A 19900930 (199134)*
ADT SU 1595907 A SU 1988-4460702 19880713
PRAI SU 1988-4460702 19880713
IC C13K001-04
AB SU 1595907 A UPAB: 19930928
Biologically c)active materials are extracted from raw vegetable materials more efficiently as follows. The starting material is treated with pentose hydrolysate used as an acid reagent, with solid to liquid ratio equal to 0.1-1.0. The extract is then concentrated under vacuum to 6-30 wt.% solids

content, **heated** to 50-100 deg.C and the clarified part of the concentrate is sepd.

USE/ADVANTAGE - In the microbiological industry for prepn. of extractive biologically active materials from raw vegetable materials used for prepn. of sugar solns. by hydrolysis. Used in prodn. of fodder yeasts, **furfural**, xylitol and other prods. Increased yield is obtd. Bul.36/30.9.90 @(3pp Dwg.No.0/0)

FS CPI
FA AB; DCN
MC CPI: B04-A07F2; B04-B02B2; B07-A01; B10-A07; C04-A07F2; C04-B02B2; C07-A01; C10-A07; D05-H13; D06-H; **E07-A01**; E10-A07; E11-Q01

L80 ANSWER 8 OF 18 WPIX (C) 2003 THOMSON DERWENT
AN 1991-205955 [28] WPIX
DNC C1991-089541
TI **Furfural** prodn. - by thermal treatment of **pentosan** -contg. vegetable material, impregnated with diluted sulphuric acid, using **gaseous heat** carrier.
DC A41 D17 E13
IN GOLUBROV, I M; RASKIN, M N; ZYSIN, L V
PA (GIDR-R) GIDROLIZPROM HYDROL
CYC 1
PI SU 1587051 A 19900823 (199128)*
ADT SU 1587051 A SU 1988-4436070 19880329
PRAI SU 1988-4436070 19880329
IC C07D307-50
AB SU 1587051 A UPAB: 19930928

Furfural is produced by treatment of vegetable material contg. **pentosan** (e.g. wood shavings, sunflower stalks, etc.), previously impregnated with 1-6% H2SO4 soln. in counter-current of hot **gaseous heat** carrier (e.g. **steam**, at 300-400 deg.C and 0.02-0.1 MPa, or optional inert **gaseous heat** carrier), with simultaneous diminution of material to particle size 20-70 microns.

The yield of **furfural** is increased to 90% of theoretical yield against 26-42% by the known method. The consumption of **gaseous heat** carrier is 1-8 kg/kg of absolutely dry starting material. The time of residence of **furfural** in **reactor** is reduced to 0.05-0.1 sec. and the size of equipment is reduced owing to intensified **heat**-mass transfer and chemical processes. Cellulose-lignin flour, obtd. as by prod., can be utilised by further hydrolysis, to produce sugars or used as filler for high MWt. cpds. etc.

USE/ADVANTAGE - Produced **furfural** is widely used in prodn. of plastics. Increased yield of **furfural** is obtd. using intensified technology. Bul.31/23.8.90 @(4pp Dwg.No.0/0)

FS CPI
FA AB; DCN
MC CPI: A01-E10; D06-C; **E07-A01**

L80 ANSWER 9 OF 18 WPIX (C) 2003 THOMSON DERWENT
AN 1991-085410 [12] WPIX
DNC C1991-036443
TI Prodn. of **furfural** from vegetable material - by two-stage treatment with sulphuric acid soln. and treatment with **steam** in autoclave.
DC A41 E13
IN NECHAEV, E A; ROVENSKII, V T; SOKOL, E I
PA (DNCH) DNEPR CHEM TECHN INST
CYC 1
PI SU 1558911 A 19900423 (199112)*
ADT SU 1558911 A SU 1988-4404461 19880112
PRAI SU 1988-4404461 19880112

IC C07D307-50
AB SU 1558911 A UPAB: 19930928
Proposed method comprises treatment of vegetable at 20-60 deg.C, with H2SO4 soln. in amt. 0.7-2.8 per wt. of absolutely dry starting material, equal to the value of active ash content of starting material and distributed in 2-3.6 times its amt. of water, in volume corresp. to that of stationary liq.; washing with 2-3.6 times its amt. of water, removing the excess, impregnation with 2-3.6 times its amt. of 0.5-1.5% H2SO4 soln., removing excess acid and treatment with **steam** at 170-175 deg.C in an autoclave, with **furfural** distilled off for 60-90 mins.

Tests show that the proposed method increases the yield of **furfural** to 76.2-82.1% (i.e. by 1.4 times compared to the known method). The duration of the stage of distn. and collection of produced **furfural** is reduced to 60-90 mins. i.e. by 50%, compared to the known method.

USE/ADVANTAGE - **Furfural** is used as solvent and as starting material in prodn. of plastics. Increased yield of prod. and reduced duration of distn. Bul.15/23.4.90
0/0
FS CPI
FA AB; DCN
MC CPI: A01-E10; **E07-A01**

L80 ANSWER 10 OF 18 WPIX (C) 2003 THOMSON DERWENT
AN 1989-214067 [30] WPIX
DNC C1989-095167
TI **Furfural** prodn. from **pentosan**-contg. raw material - by passing raw material suspension in sulphuric acid into flow reactor, and passing reaction mixt. into pressure releasing evaporator.
DC E13
IN **ZEITSCH, K J**
PA (KRPP) KRUPP GMBH FRIED
CYC 5
PI DE 3842825 A 19890720 (198930)* 9p
FI 8806014 A 19890709 (198940)
ZA 8900080 A 19891025 (198947)
US 4912237 A 19900327 (199018)
DE 3842825 C 19910124 (199104)
CH 678183 A 19910815 (199138)
ADT DE 3842825 A DE 1988-3842825 19881220; ZA 8900080 A ZA 1989-80 19890105; US 4912237 A US 1989-295314 19890109
PRAI DE 1988-3800317 19880108; DE 1988-3842825 19881220
IC C07D307-50; C13G001-00
AB DE 3842825 A UPAB: 19930923
Furfural is prepd. from **pentosan**-contg. raw materials by hydrolysis and dehydration in an acid medium in a process in which a suspension of the comminuted raw material in dil. H2SO4 is passed continuously to a flow reactor where it is mixed with high pressure steam to raise the tmep. to 170-230 deg.C, esp. 210-230 deg.C then the reacted suspension is cooled in a heat exchanger to 140-200 deg.C and passed via a valve into a pressure release evaporator in which the prevailing press is less than or equal to 1012 hPa (760 Torr), pref. 67-267 hPa (50-200 Torr) to separate the **furfural** formed and the resuting **furfural**-water vapour mxit., either directly or after condensn., is subjected to conventional distn..

USE/ADVANTAGE - The process allows continuous industrial scale prodn. of **furfural** from raw materials such as bagasse, oat husks, corn cob residues, wood waste and straw in very short reaction times and with very little polymerisation of the prod. yields are much higher than in prior art processes and the ratio of reactor space to prodn. rate is considerably lower. The residual suspension is dewatered and the still hot dil. acid extracted is recirculated to the reaction stage. The solid

residual material recovered has a low moisture content and a low acid content.
0/3
FS CPI
FA AB; DCN
MC CPI: E07-A01
ABEQ DE 3842825 C UPAB: 19930923
Furfural is mfd. from raw materials contg. pentosane by a process in which the crushed raw material, e.g. wood pulp is continuously fed as a suspension with dil. H2SO4 to a flow reactor at 170-230 deg.C for mixing with high pressure steam. Reacted suspension passes into a heat exchanger for cooling to 140-200 deg.C and then through a valve of a flash vaporiser, where pressure is adjusted to less than a equal to 1013 kPa. The water-**furfural**-steam mixt. is condensed or supplied direct for distillation.
ADVANTAGE - Highest possible **furfural** concn. with minimum capital and prodn. costs.
ABEQ US 4912237 A UPAB: 19930923
Furfural is made by (a) passing a suspension of comminuted **pentosan**-contg. raw material in dil. H2SO4 continuously through a flow reactor, and mixing with high-pressure steam at 170-230 deg.C for residence time to hydrolyse and dehydrate **pentosan** to **furfural**.
Process then comprises (b) cooling reacted **furfural**-contg. suspension, discharged from the reactor in a heat exchanger to 140-200 deg.C; (c) passing prod. through a valve into an expansion evaporator maintained at 760 Torr or less to separate residual **furfural**-contg. suspension phase from a water/**furfural** mixed vapour phase; and (d) recovering prod. from vapour phase by distn. opt. after liquefaction.
ADVANTAGE - High concn. of **furfural** is obtd. with min. capital and prodn. costs.

L80 ANSWER 11 OF 18 WPIX (C) 2003 THOMSON DERWENT
AN 1988-044144 [07] WPIX
DNC C1988-019674
TI Processing lignocellulosic plant material - to produce **furfural** and foodstuff for livestock.
DC C03 D13 E13
IN FRAYER, J Y P; GLIKMANS, G I; LAFONT, S J
PA (FRCS-N) CIE FR ETUD CONS TE; (TECH-N) TECHNIP CIE PR CONS
CYC 3
PI FR 2600063 A 19871218 (198807)* 14p
BR 8701663 A 19880209 (198811)
CN 87104684 A 19880127 (198911)
ADT FR 2600063 A FR 1986-8448 19860611; CN 87104684 A CN 1987-104684 19870611
PRAI FR 1986-8448 19860611
IC A23K001-14; C07D307-48
AB FR 2600063 A UPAB: 19950110
A process is claimed for treating ligno-cellulosic plant materials (I) to produce partic. **furfural**, by subjecting (I) to **steam** cracking to ensure digestion of (I) and form a pulp contg. insoluble materials such as cellulose and lignin and soluble materials such as pentosanes (II) and pentoses (III). The improvement is that the materials obtd. from the **steam** cracking are washed with water to extract (II) and (III), the washing before done after introducing an acid into these materials so as to increase the solubility of (II) which are then processed to produce **furfural**, while the residue of the washed insoluble materials is sepd. and used as foodstuff for livestock.
Pref. the acid in phosphoric or **acetic acid** used at 0.5-5 wt% of the solids equiv. of the material leaving the **steam** cracking plant.
ADVANTAGE - The process enables the prodn. of both **furfural**

and foodstuff for livestock.
0/2
Dwg.0/2
FS CPI
FA AB; DCN
MC CPI: C04-A07D5; C07-A01; C12-L09; D03-G04; **E07-A01**; N04

L80 ANSWER 12 OF 18 WPIX (C) 2003 THOMSON DERWENT
AN **1986-100817** [16] WPIX
DNC **C1986-043217**
TI Cellulose and **furfurol** prepn. from cellulose-contg. material - by pre-hydrolysis with dil. acid to convert **pentosan** to pentose followed by chemical dehydration of pentose to **furfurol**.
DC E13 F09
IN KNAUTH, I
PA (KNAU-I) KNAUTH H
CYC 1
PI DE 3435451 A 19860410 (198616)* 6p
PRAI DE 1984-3435451 19840927
IC C07D307-50; D21C003-04
AB DE 3435451 A UPAB: 19930922
The material to be decomposed is **heated** with a dil. acid below 150 deg.C, until the **pentosans** are hydrolysed to pentoses. After adding a cpd. causing dehydration, the compsn. is **heated** quickly above 160 deg.C, until decompsn. is completed, and the **furfurol**, forming from the pentoses, is discharged.
ADVANTAGE - **Furfurol** yields reach at least 60% of the theoretical. The dehydration of the pentoses to **furfurol** does not affect cellulose decompsn. The hydrolysis of the **pentosans** to pentoses is completed before decompsn. and side-reactions with **furfurol** are prevented. The pre-hydrolysis sugars are not extd. and the **furfurol** concn. in the final condensate is at least 10%, whereby energy consumption and appts.-investment are reduced.
0/0
FS CPI
FA AB
MC CPI: A01-E14; E07-A02E; F05-A02A; F05-A02C

L80 ANSWER 13 OF 18 WPIX (C) 2003 THOMSON DERWENT
AN 1984-257462 [42] WPIX
DNC C1984-108874
TI **Furfurol** and glucose prodn. from cellulose contg. material - by hydrolysis in two stages with different acid concns..
DC D17 E13 E17
IN KNAUTH, I
PA (KNAU-I) KNAUTH H
CYC 1
PI DE 3312450 A 19841011 (198442)* 6p
DE 3312450 C 19850207 (198507)
ADT DE 3312450 A DE 1983-3312450 19830407
PRAI DE 1983-3312450 19830407
IC C07D307-50; C13K001-02
AB DE 3312450 A UPAB: 19930925
Two-stage method for making **furfural** (I) and glucose (II) by acid hydrolysis of cellulose-contg. material comprises first impregnating with dil. acid. The acid is then conc. by drying so that hydrolysis of **pentosans** to pentose occurs at below 100 deg.C. Then the acid is further conc. by additional **heating** so that pentoses are dehydrated at about 100 deg.C to form (I).
ADVANTAGE - The **pentosan** concn. in the first stage prod. is so high that (I) formed by dehydration can be recovered, without loss, by direct evapn. Substances such as **acetic acid**, formed in the first stage, are removed during drying, so that subsequent

reaction is facilitated.
0/0
FS CPI
FA AB
MC CPI: D05-B; D06-G; **E07-A01**; E10-A07
ABEQ DE 3312450 C UPAB: 19930925
Two-stage method for making **furfural** (I) and glucose (II) by acid hydrolysis of cellulose-contg. material comprises first impregnating with dil. acid. The acid is then conc. by drying so that hydrolysis of **pentosans** to pentose occurs at below 100 deg.C. Then the acid is further conc. by additional **heating** so that pentoses are dehydrated at about 100 deg.C to form (I).
ADVANTAGE - The **pentosan** concn. in the first stage prod. is so high that (I) formed by dehydration can be recovered, without loss, by direct evapn. Substances such as **acetic acid**, formed in the first stage, are removed during drying, so that subsequent reaction is facilitated.
0/0

L80 ANSWER 14 OF 18 WPIX (C) 2003 THOMSON DERWENT
AN **1984-225445** [36] WPIX
DNC **C1984-095162**
TI Hydrolysis of cellulosic or starch materials - to form reducing sugars, using acetone with minor amts. water and acid catalyst.
DC C03 D13 D17
IN PASZNER, L
PA (OSHA-I) OSHAUGHNESSY J P; (PASZ-I) PASZNER L
CYC 17
PI WO 8403304 A 19840830 (198436)* EN 41p
RW: AT BE CH DE FR GB LU NL SE
W: AU BR DE GB JP SU
AU 8425779 A 19840910 (198449)
EP 138882 A 19850502 (198518) EN
R: AT BE CH DE FR GB LI LU NL SE
HU 34777 T 19850429 (198526)
AU 8433096 A 19860327 (198620)
CA 1230592 A 19871222 (198808)
CN 1082115 A 19940216 (199522) C13K001-00
ADT WO 8403304 A WO 1984-US213 19840216; EP 138882 A EP 1984-901147 19840216; CN 1082115 A CN 1992-108976 19920730
PRAI HU 1983-545 19830216
REP 2.Jnl.Ref; CA 1118772; DE 2142362; FR 2400557; WO 8203409
IC A23J001-12; C07G001-00; C07G007-00; C13D001-14; C13K001-02; D21C003-04
AB WO 8403304 A UPAB: 19930925
Prodn. of reducing sugars (I) from carbohydrate materials (II) (comminuted cellulosic materials contg. lignin and/or starch-contg. cereal grains or tubers) involves treatment with H2O/**Me2CO**/ acid catalyst at high **temp**./high **pressure**. The improvement is as follows: (a) the hydrolysis liq. contains at least 70 vol. % **Me2CO**, H2O, and an acid catalyst; (b) the comminuted (II) is treated for a limited time at elevated **temps**. until it is at least partially dissolved and at least 90 % of the solubilised sugars from those potentially available are dissolved (without degradation to non-sugars) in the liq.; and (c) the liq. is rapidly cooled as it is removed from the **pressure** vessel.
USE/ADVANTAGE - Use of high **Me2CO** concns. in the liq. allows the formation of a stable reaction complex with sugars (I) which prevents, their degradation, accelerates the hydrolysis process, and facilitates sepn. of individual (I). Thus the process may afford high purity, low DP cellulose, as well as protein residues useful as animal feeds, industrial fillers and adsorbents, etc.
0/0
FS CPI

FA AB
MC CPI: C04-B04A; C04-C02; C04-D01; C12-L09; D03-G04

L80 ANSWER 15 OF 18 WPIX (C) 2003 THOMSON DERWENT
AN 1984-099882 [16] WPIX
DNC C1984-042606
TI **Furfurol** fabricator from vegetable stock - has hydrolyser with **vapour** cleaner, impeller, and turbine.
DC E13
IN KEBICH, M S; MOROZOV, E F; SHKUT, V M
PA (BEKI) BELORUSS KIROV TECHN INS
CYC 1
PI SU 1028670 A 19830715 (198416)* 5p
ADT SU 1028670 A SU 1980-2986626 19800917
PRAI SU 1980-2986626 19800917
IC C07D307-50
AB SU 1028670 A UPAB: 19930925
The fabricator comprises a hydrolyser (1) with a neck (2), a **heat** carrier feed pipe, and a **vapour** discharge pipe which is a cleaner inside hydrolyser (1). For treatment in an ascending stream of **heat** carrier at 160-170 deg. C and 0.6-0.8 MPa in the presence of 10-15 per cent concn. sulphuric acid totalling 20-30 per cent of the absolutely dry stock weight, the **vapours** are taken off at a mass velocity of 2.04-4.40 t/h per m2 of cross section of hydrolyser (1).
The **vapour** cleaner is made as a casing (4) with slits and guide blades on its lateral surface and housing an impeller (7) on the shaft, and a subsequent turbine (9). The **vapours** formed at 7-10 gauge atmospheres enter the top of casing (4) and rotate impeller (7) and turbine (9). The substantial **pressure** drop (4-5 gauge atmospheres) between hydrolyser (1) and the **vapour** converter, increases the speed of impeller (7) and thus the velocity of the **vapours** passing between casing (4) and inverted cone (12). Thus the centrifugal forces are increased in a 1.3-litre **reactor** on treatment of the stock for 90-120 minutes. Bul.26/15.7.83.
2/2
FS CPI
FA AB
MC CPI: **E07-A01**

L80 ANSWER 16 OF 18 WPIX (C) 2003 THOMSON DERWENT
AN 1984-028143 [05] WPIX
DNC C1984-012316
TI Prepn. of **furfural** - by hydrolysis of **pentosan**-contg. material over catalyst consisting of zirconium di oxide and sulphuric acid.
DC A41 E13
IN KRUPENSKII, V I
PA (UKHT-R) UKHTA IND INST
CYC 1
PI SU 1006436 A 19830323 (198405)* 2p
ADT SU 1006436 A SU 1981-3331257 19810612
PRAI SU 1981-3331257 19810612
IC B01J021-06; C07D030-50
AB SU 1006436 A UPAB: 19930925
Furfural is prepd. by hydrolysis of **pentosan**-contg. plant raw material at 160-170 deg. C and 3-8 kg per sq.cm. **pressure**, in the presence of 0.6-0.8% catalytic soln. of Group IV metal dioxide in 3-5% H2SO4. The soln. consists of 30-35% wt. of the starting material. The yield of **furfural** is increased by using ZrO2 as the group IV cpd.
0/0
FS CPI
FA AB

MC CPI: A01-E10; **E07-A01**; N03-B

L80 ANSWER 17 OF 18 WPIX (C) 2003 THOMSON DERWENT
AN 1983-26915K [11] WPIX
DNC C1983-026376
TI Mfr. of **furfural** from **pentosan**-contg. green-wood - by hydrolysis of wood pulp at elevated **temp**. and **pressure** in presence of **acetic acid**.
DC E13
IN FEDOTOVA, S A; MELNIKOV, N P; TSIRLIN, Y U A
PA (GIDR-R) GIDROLIZPROM RES
CYC 1
PI SU 925955 B 19820507 (198311)* 2p
PRAI SU 1979-2821001 19790724
IC C07D307-50
AB SU 925955 B UPAB: 19930925
Furfural, used in organic and polymer chemistry, is prepd. in the increased yield, by hydrolysis of **pentosan**-contg. vegetable raw material at 183-185 deg. C and 10-10.5 kg per sq.cm. **pressure** in the presence of 15-20% AcOH.
Typically 100 g of crushed birch and aspen greenwood (contg. potentially 15-16% **furfural** at 45% moisture content) is soaked with 15% AcOH soln. (15-20% of the wt. of dry raw material) is hydrolysed with **steam** at 183-185 deg. C and 10-10.5 kg per sq.cm. **pressure**.
The **furfural**-contg. **vapour** is condensed and the condensate rectified yielding 8.2% of 99.5% prod. based on the wt. of dry raw material. The hydrolysis proceeds for 90-100 min. Bul.17/7.5.82
FS CPI
FA AB
MC CPI: **E07-A01**

L80 ANSWER 18 OF 18 WPIX (C) 2003 THOMSON DERWENT
AN 1983-03982K [02] WPIX
DNC C1983-003955
TI Prepn. of **furfural** for polymer synthesis - by impregnating timber with sulphuric acid, hydrolysis, **steam** distillation of residue under **pressure**, and hexose hydrolysis.
DC A41 E13
IN DMITRENKO, L V; MELAMED, T S E; MELNIKOV, N P
PA (HYDR-R) HYDROLYSIS IND SCI
CYC 1
PI SU 910631 B 19820307 (198302)* 2p
PRAI SU 1978-2734460 19781213
IC C07D307-50
AB SU 910631 B UPAB: 19930925
Furfural (I) is obtd. from **pentosan**-contg. material (II) such as birch or aspen more efficiently and corrosion of the Ti hydrolysers reduced when (II) is treated with 0.95-1.2% H_2SO_4 in the hydrolyser, then the liquid squeezed out with **compressed** air or live **steam** under the **pressure** of 1.5-2 to 4-5 kg/sq.cm.
The liquid phase is re-routed for use at the head of the process, and the residue acted upon by live **steam** under the **pressure** of 9-11 kg/sq.cm. and 180 deg. C. The **steam** contg. (I) is taken off from the hydrolyser top and condensed. After this the residue is **reheated** to 180 deg. C with live **steam**, 0.5-0.6% H_2SO_4 added and hexose hydrolysis carried out under the **pressure** of 9-12 kg/sq.cm. the hydrolysate taken off from the bottom and lignin residue removed from the hydrolyser. Bul. 9/7.3.82.
FS CPI
FA AB
MC CPI: A01-E10; **E07-A01**

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=> d his

     (FILE 'HOME' ENTERED AT 16:41:52 ON 16 FEB 2003)
               SET COST OFF

     FILE 'REGISTRY' ENTERED AT 16:42:06 ON 16 FEB 2003
               E FURFURAL/CN
L1             1 S E3
L2             1 S PHOSPHORIC ACID/CN
L3             1 S ACETIC ACID/CN

     FILE 'HCAPLUS' ENTERED AT 16:43:08 ON 16 FEB 2003
L4         14433 S L1
L5         18796 S FURFURAL
L6          8325 S FURALDEHYDE OR FURFURALDEHYDE OR FURFUROL# OR FUROLE OR ALPHA
L7          1207 S 2()(FURANCARBALDEHYDE OR FURANCARBONAL OR FURFURAL OR FURFURA
L8          1863 S 2 FURANCARBOXALDEHYDE
L9           158 S FURAN 2 CARBOXALDEHYDE
L10           24 S FURFURYLALDEHYDE
L11           25 S 2 FURAN CARBOXALDEHYDE
L12            9 S 2 FURYL ALDEHYDE
L13           51 S FURAN 2 ALDEHYDE
L14        28529 S L4-L13
L15          817 S L14 AND  PENTOSAN?
               E PENTOSAN/CT
               E E5+ALL
L16         1348 S E4
L17          172 S L14 AND L16
L18          817 S L15,L17
L19          110 S L18 AND ?PRESSUR?
L20          152 S L1/P AND L18
L21           30 S L20 AND L19
L22           38 S L20 AND STEAM?
L23           22 S L20 AND (?VAPOR? OR ?VAPOUR?)
L24           57 S L20 AND (TEMPERATURE OR HEAT? OR THERM?)
L25           85 S L21-L24
L26            1 S L25 AND DEPRESSUR?
               E REACTOR/CT
L27           58 S E9+NT AND L14
L28            8 S L27 AND ?PRESSUR?
               SEL DN AN 1 6
L29            2 S E1-E6
L30          610 S L14 AND ?SACCHARIDE?
               E POLYSACCHARIDES/CT
               E E3+ALL
L31          127 S E4,E3 AND L14
L32         1353 S L18,L30,L31
L33          241 S L32 AND L1/P
L34           39 S L33 AND ?PRESSUR?
L35           23 S L34 AND (STEAM? OR ?VAPOR? OR ?VAPOUR?)
L36           24 S L26,L29,L35
L37            3 S L36 AND (L2 OR L3 OR PHOSPHORIC ACID OR ACETIC ACID OR H2PO4)
L38           15 S L36 AND ?HEAT?
L39           15 S L34 AND ?STEAM?
L40           24 S L36-L39
               E ZEITSCH K/AU
L41           33 S E3-E9
               E EPOPL H/AU
L42            8 S L41 AND L14
L43            7 S L1/P AND L42
L44           29 S L40,L43
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L45           1 S L42 NOT L44
L46          30 S L44,L45
L47          30 S L46 AND (?STEAM? OR ?HEAT? OR TEMPERATURE OR ?THERM? OR ?STEA
L48           6 S L47 AND (?BOIL? OR EBULL?)
L49           1 S L47 AND ?COMPRES?
L50          30 S L47-L49
L51          30 S L50 AND L4-L50
                SEL HIT RN

     FILE 'REGISTRY' ENTERED AT 17:01:41 ON 16 FEB 2003
L52           2 S E1-E2

     FILE 'REGISTRY' ENTERED AT 17:02:22 ON 16 FEB 2003

     FILE 'HCAPLUS' ENTERED AT 17:02:37 ON 16 FEB 2003

     FILE 'WPIX' ENTERED AT 17:03:05 ON 16 FEB 2003
                E WP2000-ZA24/AP,PRN
                E WO2000-ZA24/AP,PRN
L53           1 S E3
                E DE99-19905655/AP,PRN
L54           1 S E3,E4
L55           1 S L53,L54
L56          35 S C07D307-50/ICI,ICM,ICS
L57        2893 S L5-L13
                E FURFURAL/DCN
                E E3+ALL
L58         518 S E2 OR 0661/DRN
L59        3057 S L57,L58
L60          50 S L59 AND N161/M0,M1,M2,M3,M4,M5,M6
L61          71 S L59 AND N421/M0,M1,M2,M3,M4,M5,M6
L62         284 S L59 AND N513/M0,M1,M2,M3,M4,M5,M6
L63          85 S L59 AND N514/M0,M1,M2,M3,M4,M5,M6
L64          53 S L57 AND PENTOSAN/BIX
L65          27 S L57 AND L56
L66         111 S L60,L64,L65
L67          46 S L66 AND L62,L63
L68          19 S L67 AND L61
L69          15 S L68 AND E07-A01/MC
L70          13 S L69 NOT LEVULINIC/TI
L71          13 S L55,L70
L72           4 S L68 NOT L69
                SEL DN AN 2 3
L73           2 S L72 AND E1-E4
                SEL DN AN 4 L72
L74           1 S E5-E6
L75          16 S L71,L73,L74 AND L53-L74
L76          16 S L75 AND (?STEAM? OR GAS? OR ?HEAT? OR TEMPERATURE OR REACTOR
L77           4 S L76 AND (ME2CO OR ACETIC ACID OR 0247/DRN OR R00247/DCN)
                E ZEITSCH K/AU
L78          17 S E3,E4
                E EPOPL H/AU
L79           4 S L78 AND L59
L80          18 S L76,L77,L79 AND L53-L79

     FILE 'WPIX' ENTERED AT 17:19:05 ON 16 FEB 2003
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